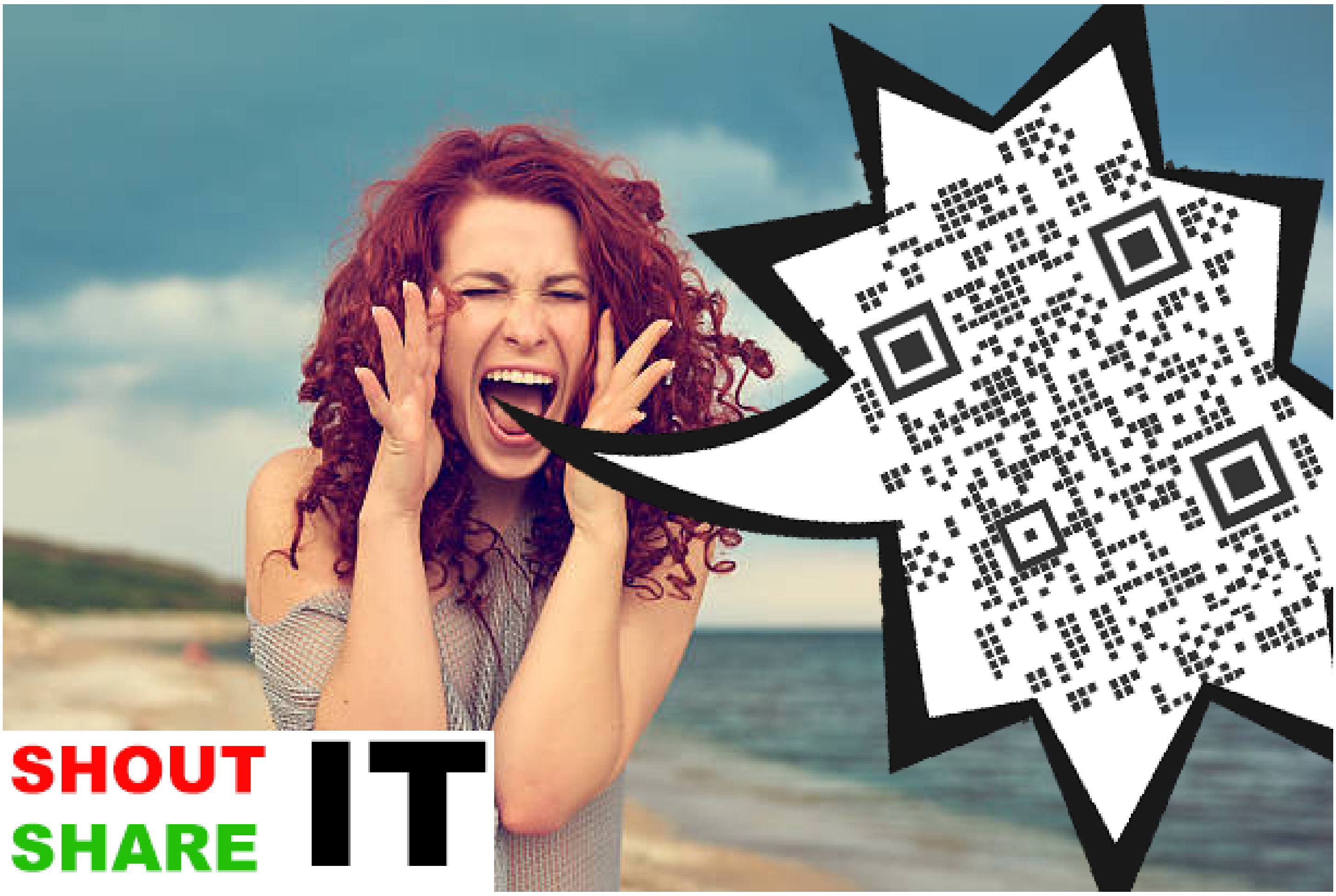
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PROCEEDINGS

OF THE

Biological Society of Washington

VOLUME XI

1897

WASHINGTON
PRINTED FOR THE SOCIETY
1897

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INSTITUTION

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JUDD & DETWEILER, Printers

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OFFICERS AND COUNCIL

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

For 1897

(ELECTED DECEMBER 19, 1896)

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---

* Ex-Presidents of the Society.

VOL. XI, PP. VII-XII DECEMBER 30, 1897

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

PROCEEDINGS.

The Society meets in the Assembly Hall of the Cosmos Club on alternate Saturdays at 8 p. m. Brief notices of the meetings, with abstracts of the papers, are published in *Science.*

January 2, 1897—269th Meeting.

The President in the chair and 45 persons present.

F. A. Lucas exhibited skulls of the fur-seal showing deformities of the jaw-bones.

The following communications were presented:

E. W. Nelson: New Birds from Mexico.*

F. A. Lucas: On the Natural Mortality among Fur-seals.

January 16, 1897—270th Meeting.

The President in the chair and 36 persons present.

Theo. Holm exhibited a copy of Fuchs' 'Histoire des Plantes,' published in 1549; also the first and last volumes of the 'Flora Danica.' He then exhibited a specimen of *Draba hyperborea*, calling attention to its monopodial development.

W. T. Swingle exhibited some algæ from the Bay of Naples, remarkable for the size of their special cells.

V. K. Chesnut showed specimens of *Cicuta vagans* and *Nerium oleander*, discussing their poisonous properties.

The following communications were presented:

David White: Unity or Plurality of Type Specimens in Palæontology.

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*The Auk, XIV, pp. 42–76, Jan., 1897.

David White: A New Lycopodineous Cone from the Coal Measures of Missouri.*

Edward L. Greene: The Development of the Idea of a Genus.

M. A. Carleton: The Ontogenetic Separation of *Puccinia graminis avenæ* from *P. graminis tritici.*

January 30, 1897—271st Meeting.

The President in the chair and 45 persons present.

The following communications were presented:

C. Hart Merriam: The Pribilof Island Hair Seal.

C. H. Townsend: The Origin of the Alaskan Live Mammoth Story.†

Frank Benton: The Giant Bee of India.

L. O. Howard: Parasites of Shade Tree Insects in Washington.‡

February 27, 1897—272d Meeting.

The President in the chair and 28 persons present.

The following communications were presented:

C. H. Townsend: The Distribution and Migration of the Northern Fur-seal.§

Charles L. Pollard: What Constitutes a Type in Botany?

Lester F. Ward: Descriptions of Seven Species of *Cycadeoidea* from the Iron Ore Deposits of Maryland.||

March 13, 1897—273d Meeting.

The President in the chair and 30 persons present.

The following communications were presented:

T. W. Vaughan and R. T. Hill: The Lower Cretaceous *Grypheas* of the Texas Region.

Charles F. Dawson: The Dissemination of Infectious Diseases by Insects.¶

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* To be published in Monographs U. S. Geol. Survey.

† The Alaska Live Mammoth Story. <Forest and Stream, XLIX, pp. 124–125, Aug. 14, 1897.

‡ A Study in Insect Parasites. <Bull. V, Technical Series, No. 5, Division of Entomology, U. S. Dept. of Agriculture.

§ To be published in Report of the Bering Sea Commission for 1896.

|| Proc. Biol. Soc. Wash., XI, pp. 1–17, 1897.

¶ To be published in Ann. Report for 1897, Bureau of Animal Industry, U. S. Dept. of Agriculture.

William Palmer: The Type (?) of a New Old Species.

Sylvester D. Judd: Sexual Dimorphism in Crustacea.

March 27, 1897—274th Meeting.

The President in the chair and 30 persons present.

The following communications were presented:

M. B. Waite: Factors Governing Pear Blight.*

E. A. De Schweinitz: Some Methods of Generating Formaldehyde and its Use as a Disinfectant.†

Theo. Holm: The Grass Embryo and its Constituents.‡

April 10, 1897—275th Meeting.

Ex-President W. H. Dall in the chair and 31 persons present.

The following communications were presented:

Theo. Gill and C. H. Townsend: Diagnosis of Deep-sea Fishes. (Read by title.) §

Jonathan Dwight, Jr.: A Species of Shearwater (*Puffinus assimilis* Gould) New to the North American Fauna.||

Sylvester D. Judd: Antennal Circulation in Crangonyx.

Charles T. Simpson: Notes on the Classification of Unios.¶

H. C. Oberholser: The American Golden Warblers.

T. Wayland Vaughan: Notes on a Monograph of the Eocene Corals of the United States.

April 24, 1897—276th Meeting.

Ex-President W. H. Dall in the chair and 31 persons present.

Edward L. Greene exhibited and commented upon specimens of *Viola emarginata* and *V. heterophylla*.

The following communications were presented:

M. A. Carleton: Climate as an Element in Wheat Environment.

---

* Substance in article entitled 'Cause and Prevention of Pear Blight.' <Yearbook U. S. Dept. Agric. for 1895, pp. 295–300, 1896.

† Journal of the American Public Health Association, October, 1896 (in part).

‡ Am. Journ. Sci., iv, pp. 13–26, July, 1897.

§ Proc. Biol. Soc. Wash., xi, pp. 231–234, September 17, 1897.

|| Proc. Biol. Soc. Wash., xi, pp. 69–70, April 21, 1897.

¶ Nautilus, xi, pp. 18–23, June, 1897.

Frederick V. Coville: Plant Food of the Wild Ducks in Chesapeake Bay.

Frederick V. Coville: The Water Hyacinth, *Piaropus crassipes*, as an Obstruction to Navigation in Florida.

L. H. Dewey: The Eastward Migration of Certain Weeds in America.*

May 8, 1897—277th Meeting.

The President in the chair and 56 persons present.

The following communication was presented:

C. Hart Merriam: Suggestions for a New Method of Weighing Species and Subspecies.†

By invitation, Hon. Theodore Roosevelt, Assistant Secretary of the Navy, presented an address on the same subject.

May 22, 1897—278th Meeting.

Ex-President Theodore Gill in the chair and 23 persons present.

David White exhibited eroded quartz pebbles found on the summit of a mountain, commenting on the probable cause.

The following communications were presented:

Erwin F. Smith: A Bacterial Disease of Cruciferous Plants ‡

B. T. Galloway: The Effects of Environment on Host and Parasite in Certain Diseases of Plants.

V. K. Chesnut: The Poison of the Common Black Nightshade.§

October 9, 1897—279th Meeting.

The President in the chair and 29 persons present.

L. O. Howard exhibited a specimen of *Belostoma colossicum* from Cuba, comparing it with the native *Benæus griseus*.

The following communications were presented:

R. T. Hill: Notes on Antillean Faunas, Past and Present.

B. W. Evermann: The Catfishes of Louisiana.||

Theo. Gill: The Insufficiency of the Order Bunotheria.

---

* Asa Gray Bulletin, v, pp. 31–34, June 11, 1897.

† Suggestions for a New Method of Discriminating between Species and Subspecies. < Science, n. s., v. pp. 753–758, May 14, 1897.

‡ *Pseudomonas campestris* (Pammel): the Cause of a Brown Rot in Cruciferous Plants. < Centralb. für Bakteriologie Abt. ii, Band 3. 1897.

§ To be published in a Farmer's Bulletin, U. S. Dept. of Agriculture, with descriptions of other poisonous plants.

|| To be published in Bull. U. S. Fish Commission for 1898.

October 23, 1897—280th Meeting.

The President in the chair and 37 persons present.

The following communications were presented:

F. A. Lucas and C. W. Stiles: A Dangerous Parasite of the Fur-seal.

C. W. Stiles: The International Committee on Zoölogical Nomenclature.

M. B. Waite: A New Peach and Plum Disease.

F. V. Coville: The History and Distribution of *Abies shastensis*.*

By invitation, Prof. Mitsukuri, of the Imperial University, Tokyo, Japan, addressed the Society on the condition and progress of biological science in Japan.

November 6, 1897—281st Meeting.

The President in the chair and 39 persons present.

Lester F. Ward exhibited *Prosopis juliflora* from Kansas; also specimens of *Psoralea tenuiflora*, commenting on its tumbleweed propensities; and of *Lotus americanus*, a peculiar compass-plant.

E. L. Morris exhibited alcoholic specimens of vertebrates and invertebrates, showing methods of sectioning the alimentary canal.

The following communications were presented:

Charles L. Pollard: A Publication Problem in Botany.

M. G. Motter: Underground Zoology.†

F. A. Lucas: The Fossil Bison of North America.

C. Hart Merriam: Life Zones of the Olympic Mountains.

November 20, 1897—282d Meeting.

The President in the chair and 40 persons present.

David White exhibited various specimens of fossil carboniferous ferns.

Erwin F. Smith showed a new form of hypodermic injection syringe.

The following communications were presented:

O. F. Cook: A New Wingless Fly from Liberia.‡

V. K. Chesnut: Some Recent Cases of Mushroom Poisoning.

Erwin F. Smith: Bacterial Diseases of Plants.

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* To be published in Garden and Forest.

† To be published in the Journal of Experimental Medicine.

‡ To be published in Brandtia.

December 4, 1897—283d Meeting.

The President in the chair and 37 persons present.

Frederick V. Coville exhibited a globose mass of pine needles found on the shore of a lake in northern Idaho, commenting on the probable cause of its formation.

The following communications were presented:

L. J. Briggs: Causes of Water Movement in Soils.*

Sylvester D. Judd: Protective Adaptations of Insects from an Ornithological Point of View.

Theo. Gill: The Distinctive Characters of the Molinæ and Ranzaniinæ.

C. W. Stiles: The Honorary Ph. D.

December 18, 1897—284th Meeting.

(EIGHTEENTH ANNUAL MEETING.)

The President in the chair and 29 persons present.

The annual reports of the Recording Secretary and Treasurer for the year 1897 were presented, and officers for the year 1898 were elected as follows:

President—L. O. Howard.

Vice-Presidents—Richard Rathbun, C. D. Walcott, B. E. Fernow, F. V. Coville.

Recording Secretary—Charles L. Pollard.

Corresponding Secretary—F. A. Lucas.

Treasurer—F. H. Knowlton.

Additional Members of the Council—William H. Ashmead, Edward L. Greene, Ch. Wardell Stiles, F. W. True, M. B. Waite.

The following standing committees were appointed by the Chair:

On Communications—B. E. Fernow, chairman; F. V. Coville, M. B. Waite, E. A. De Schweinitz, W. H. Ashmead.

On Publications—C. Hart Merriam, chairman; T. S. Palmer, F. H. Knowlton.

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* Substance embodied in a Bulletin of the Division of Soils, U. S. Department of Agriculture, now in preparation.

VOL. XI, PP. 1-17 MARCH 13, 1897

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

DESCRIPTIONS OF THE SPECIES OF CYCADEOIDEA, OR FOSSIL CYCADEAN TRUNKS, THUS FAR DISCOVERED IN THE IRON ORE BELT, POTOMAC FORMATION, OF MARYLAND.*

BY LESTER F. WARD.

On November 4, 1893, I read a paper before this Society on 'Cycadean Trunks in the American Cretaceous,' which under the fuller title, 'Fossil Cycadean Trunks of North America, with a Revision of the Genus Cycadeoidea Buckland,' was published in the ninth volume of its Proceedings.† At that date only one species of cycadean trunks had been published from the Iron Ore beds of Maryland. This was founded on four specimens that had long lain in the Museum of the Maryland Academy of Sciences at Baltimore. They had been collected by Philip Tyson before the civil war, and he had mentioned them in his report as State Agricultural Chemist in 1860, recognizing their cycadean character and applying to them the term "Cycas," apparently without intending thereby to refer them to the living genus by that name, but merely to denote their resemblance to the trunks of plants familiar to all under that name. Much interest, I learn, was excited at the time by the discovery of these specimens, and the Maryland Academy of Sciences is said to have discussed their nature at a number of its meetings. Indeed, I have been told that the subject came at last to monopolize its proceedings and that considerable asperity was ultimately created in the discussions, so much so that all at length became tired of the subject and it was allowed to drop completely out of their deliberations, never to be revived. At all events, it was nearly twenty-five years before any one's attention was again prominently called to these objects.

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* Read before the Society February 27, 1897. Published by permission of the Director of the U. S. National Museum.

† Proc. Biol. Soc. Washington, vol. IX, Washington, 1894, pp. 75-88.

Mr. Tyson, however, had taken the trouble during the time that the question was uppermost to have photographs made of one of these specimens. He had also found much silicified wood in the Iron Ore beds, and he caused some large blocks of this to appear in the same view with the cycad trunk. Prints of this view were sent to many of the prominent paleontologists of this country and Europe. Among those receiving them was Dr. J. S. Newberry, and since his death his copy has been found at the Geological Museum of Columbia University and kindly placed in my hands by Dr. Arthur Hollick. In 1885 Mr. W J McGee, having learned that these specimens were still in the Museum of the Maryland Academy of Sciences, was permitted, through the kindness of the president of the Academy, Professor P. R. Uhler, to have a series of photographs taken of the two principal trunks. Copies of these photographs are also in my hands, and they were shortly after reproduced and published, forming plates clxxiv to clxxx of Professor Fontaine's Potomac or Younger Mesozoic Flora.* As stated in my former paper, Professor Fontaine described these trunks under the name *Tysonia Marylandica*, but as they do not belong to a genus distinct from those of Europe, Capellini and Solms-Laubach restored them to Buckland's genus Cycadeoida. The specimens are now in the Geological Museum of Johns Hopkins University.

Soon after the appearance of Professor Fontaine's work in 1890, Professor Uhler succeeded in obtaining a few additional fragments, but interest in the subject was not fairly aroused until about the year 1893, when Mr. Arthur Bibbins of the Woman's College of Baltimore began his remarkable series of discoveries which has resulted in bringing to light no less than fifty-nine specimens of these interesting objects. An account of his researches and results was published by me in 1894,† at which time he had already added thirty-five specimens to all that had been hitherto reported. Since that date he has continued actively to prosecute this work and has secured many more. Too great praise cannot be bestowed, either upon him for his successful method of work and his untiring zeal and industry, nor upon the Woman's College and its able president, Dr. John F. Goucher, for the liberal spirit shown, the keen scientific interest manifested, and the substantial aid rendered in advancing this work.

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* Monographs of the U. S. Geol. Survey, vol. XV, Atlas.

† Recent Discoveries of Cycadean Trunks in the Potomac Formation of Maryland. Bull. Torr. Bot. Club, vol. XXI, No. 7, July 20, 1894, pp. 291–299.

I also stated in the paper last referred to that through the generosity of President Goucher and all connected with that institution this entire collection had been loaned to the United States National Museum, and turned over to the Department of Fossil Plants for systematic elaboration, and the additional specimens, as fast as they were discovered, have also been regularly sent to Washington to join the rest. I had already commenced work on the important material of the same general nature from the Black Hills, an account of which was given in the paper presented to this Society of which I have spoken. It was decided to embody all the material in the Museum and all that could be secured from any American deposits in one general monograph of the Fossil Cycadean Trunks of North America, Dr. F. H. Knowlton to assume charge of all that pertained to the microscopic study of the internal structure and I to deal with the external and macroscopic aspects. I had hoped to have completed my part of the work before this, but many causes conspired to retard progress. Other pressing duties, both in the field and in the office, reduced the amount of time that it was possible to devote to it. The necessity for seeing the European specimens practically obliged me to spend a season on the other side of the Atlantic, the results of which had to be worked up and published.* The amount of labor involved was also very great, and the progress made is as satisfactory as could be expected under the circumstances. Much has been done on all classes of the material, but latterly I have been devoting myself chiefly to the Maryland specimens. It has been necessary to study anew all those obtained by Tyson, now in the Geological Museum of Johns Hopkins University, ample facilities for which have been generously extended to me by Professor W. B. Clark. Professor Uhler has also kindly allowed me to describe those in the Museum of the Maryland Academy of Sciences, and he sent the two principal ones to Washington for the purpose. Artistic photographs have been taken of these and of all the more important trunks in Mr. Bibbins' collection.

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* See the Sixteenth Annual Report of the U. S. Geological Survey, pp. 463–542.

A year ago I had proceeded far enough to have discovered that the cycadean trunks from the Iron Ore beds of Maryland embraced no less than seven good species which could be clearly separated and described, and since that time I have accomplished the work of describing and naming these species and of assigning each specimen to its appropriate specific group. As it is very convenient in the general discussion to be able to speak of these forms in a definite way, I have decided to publish these names with the descriptions, so that the new species may not need to be mentioned prior to such description, thereby cumbering the literature with *nomina nuda*. It is, however, clearly to be understood that these descriptions are not final, as they are based entirely on external characters and such macroscopic observations as I have been able to make of the internal parts prior, for the most part, to the cutting of sections, and do not embody any results that may be arrived at by Dr. Knowlton after a microscopic study of the various tissues. This latter, however, can scarcely result in reducing the number of species, as the more general characters are those that have been chiefly relied upon for specific differentiation, and if it results in increasing the number by showing that some of the specimens possess internal characters that cannot be specifically united with the others, this will lead to no confusion.

With regard to the classification adopted, I may remark that Buckland, in studying for the first time the fossil trunks from the Purbeck beds of the Portland quarries, called to his assistance the great contemporary botanist, Robert Brown, whom he expressly credits with the suggestion that the differences between the fossil and living forms are sufficient to establish a new family distinct from the existing family of Cycadeæ, and to which the name *Cycadeoideæ* was given. The generic name *Cycadeoidea* was also employed at the same time, but it afterwards transpired that this was not approved by Robert Brown, who only proposed the family name. Brown must therefore be credited with the name Cycadeoideæ and Buckland with Cycadeoidea. The wisdom of Brown's suggestion has been abundantly vindicated by the subsequent study of these forms, and the more their internal anatomy is made known, especially the nature of their inflorescence and fructification, the clearer it becomes that all fossil cycadean vegetation from beds below the Tertiary represented a group distinct from the recent Cycadaceæ. When the nature of the reproductive apparatus was made known by Carruthers in the remarkable specimen which came from Luccomb Chine, on the Isle of Wight, he proposed for it a new generic name *Bennettites*, and Count Solms-Laubach established on the same data the family name *Bennettiteæ*. But it soon became obvious that the restricting of this name to this one form was simply based on our ignorance of the reproductive apparatus of other trunks, and wherever further data as to the latter have been brought forward they have strengthened the presumption that most or all fossil forms possessed a similar reproductive apparatus. Count Solms has therefore, in his latest important paper on the Bennettiteæ of the Italian museums, referred them all to Buckland's genus Cycadeoidea. In this, too, he incidentally includes many other European and some American forms, while adhering to the one species of Bennettites, *B. Gibsonianus*, in which the fruit is known, and as a result of an examination of photographs of our American forms he has stated in letters to me that certain of them are certainly to be referred to Bennettites. But in such studies as I have been able to make of these forms, whether from Maryland or from the Rocky Mountain region, I am unable to see anything that can be called a generic difference, and they all resemble the Italian forms more closely than they do those from Portland. I therefore, in the former paper, grouped them all as Cycadeoidea, and I have not since seen any reason for departing from this view. Until their internal structure is further studied I shall adhere to this name, and in view of all that has been said I am disposed to extend Robert Brown's group name to all the Mesozoic cycadean vegetation, whether represented by trunks or by foliage, fruit, or other organs, on the general assumption that however many genera there may have been, if they could be correlated the foliage, etc., would belong to the trunks found in the same general beds. In a matter of which so little is known, all is at best provisional, and a convenient and flexible nomenclature is the chief result to be aimed at.

The full classification of the Cycadaceæ would therefore be to use that term to represent the entire family, both living and fossil, and to subdivide it into the two subfamilies, the Cycadeæ for the living forms and the Cycadeoideæ for the fossil forms. This is the classification adopted below.

Subkingdom SPERMATOPHYTA.

Class GYMNOSPERMÆ.

Family CYCADACEÆ Lindley.

Subfamily CYCADEOIDEÆ Robert Brown.

Fossil cycadean vegetation of Mesozoic age represented by trunks, foliage, and fruits, and embracing a large number of genera and species, the trunks usually not accompanied by other organs than the bases of the leaf stalks, and reproductive axes included in a false bark or "armor" generally of considerable thickness; foliage usually also found separate from other parts, and fruits and rarely flowers similarly isolated. The number of genera and species is therefore necessarily duplicated and multiplied, owing to the impossibility of correlating the detached parts, but that those found at similar horizons and localities belonged together admits of no doubt. The trunks differ in size and form much as do living Cycadaceæ (Cycadeæ), and characters of all parts show resemblances to existing genera. It is, however, probably incorrect to say that the latter have descended from the former, or that the fossil forms are embryonic types of the living forms, and the correct conception of the subfamily is embodied in the law of sympodial development.* according to which the principal trunk line of descent which the fossil forms represent, and which attained its maximum development in Mesozoic time, became extinct, while inferior lines or branches represented by living forms persisted into modern times. This accounts for the fact so prominently insisted upon by Count Solms-Laubach and others that the fossil forms, at least those in which the reproductive organs are preserved embedded in the armor of the trunks (Bennettites), are structurally more advanced than the living Cycadaceæ, a fact which finds its counterpart in the Lepidophyta and Calamariæ of the Carboniferous and in the Dinosauria of the Mesozoic.

Genus **Cycadeoidea** Buckland.

1827. *Cycadeoidea* Buckland, Proc. Geol. Soc. London, vol. I, No. 8, pp. 80–81 (session of June 6, 1827).

1828. *Cycadeoidea* Buckland, Trans. Geol. Soc. London, 2d ser., vol. II, pp. 375–401, pl. xlvi–xlix.

Fossil trunks of Cycadeoideæ, chiefly low (30–90 centimeters in height) and more or less conical or oval in shape (15–75 centimeters in diameter), usually simple, but sometimes branching, with a depression at the summit, in the middle of which, when not decayed, there is a terminal bud of conical shape; terminal bud, however, usually wanting in the fossils, leaving a cavity commonly known as the "crow's nest," by which name for this reason the specimens from the Portland quarries are popularly known. The armor consists of appendicular and reproductive organs surrounding and enveloping the axis, the former being the bases of the leaf stalks or petioles, which are surrounded by a dense mat of ramentum or fine hairs.

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* Proc. Biol. Soc. Washington, vol. V, Washington, 1890, p. 24. Lester F. Ward: The Course of Biologic Evolution (reprint of above), p. 2.

The leaf stalks are normally four-sided and four-angled, the lateral angles acute and nearly equal, the vertical angles obtuse but unequal, the lower much sharper than the upper, so as to render the cross section subrhombic. This form varies on the one hand to a true rhomb, and on the other hand to a true triangle, the most frequent intermediate type being that in which the upper angle is wanting, and the two upper sides are reduced to a simple curve or arch, so that the cross section assumes the form of a drawn bow and bowstring, the arch formed by the two upper sides representing the bow and the two lower sides, with their reëntrant angle, representing the bowstring. In size the leaf stalks vary from 15 to 35 millimeters in width measured between the lateral angles, and from 5 to 20 millimeters in height measured between the vertical angles, or from the lower angle to the summit of the arch formed by the two upper sides. The line joining the former is not generally horizontal or at right angles with the axis of the trunk, but one is usually slightly lower than the other. The line joining the latter is not generally vertical or parallel to the axis of the trunk, but one is usually a little on one side of the other. The only portion of the leaf bases that is always preserved in the fossil state is the mat of ramentaceous hairs that surrounds them. In the great majority of cases the petioles themselves are decayed to a greater or less distance below the summit of these mats, which thus constitute walls surrounding and enclosing the portion that remains of the petioles, if any, and in their absence forming definite cavities having the shape of the cross section of the leaf stalks, which constitute the leaf scars. These leaf scars, with or without the lower portion of the leaf bases, penetrate to the axis of the trunk and form a varying angle with it. Normally this angle is a right angle over all the central portions of the trunk, while below the organs are slightly descending and above more and more ascending to the apex, where they become vertical. At the summit, too, they diminish in size and usually in form, and are reduced in and immediately around the terminal bud to small triangular or polygonal bracts (*perulæ* of Miquel). In some species (*C. Uhleri*) all the organs of the body of the trunk are deflexed, and in one (*C. Goucheriana*) there is a definite zone near the middle of the trunk, below which they are descending and above which they are ascending. The leaf scars are arranged in a more or less exact quincunx order, and usually in two sets of spiral rows around the trunk, in one of which they ascend from the base in the direction from left to right and in the other from right to left, crossing each other at varying angles, and both rows making a certain angle with the axis of the trunk, which varies with the species and more or less with different specimens of the same species. One of the two sets of rows is usually more distinct than the other, but the more distinct rows sometimes pass upward from left to right and sometimes from right to left. The bases of the petioles when present and well preserved often show at the surface presented to view a row of pits all round parallel to the walls and at different distances from the margin representing the vascular strands. Other such pits are sometimes present near the center. The petioles are frequently disarticulated at a natural joint, which may fall near or at the summit of the scar, or it may fall some distance within the scar. In some species there are two such joints separated by a node. Occasionally these joints consist of a thin membranous diaphragm stretching across the petiole, of firmer texture than the rest of its substance. Even where the petioles are wholly absent the position of the joints or diaphragms can sometimes be determined by a sharp ridge round the inside of the scar. The walls are made up of the ramentum of two adjacent petioles. In some cases these matted masses are so dense as to produce a simple homogeneous plate on all four of the sides, which, where the petioles are wanting, forms a deep, angled cavity of exactly the shape of a cross section of the petiole. Usually the portion of the wall furnished by each of the adjacent petioles can be distinguished by a junction line or commissure, visible along the outer edge of the wall. This commissure sometimes takes the form of an intermediate plate of a less dense consistency than the two outer plates. In other cases this central plate is much thicker than the two outer ones, which latter may be reduced to the appearance of thin linings of the scars. In still other cases the central portion is more or less open and cavitous. The walls vary from 1 millimeter or even less to 5 millimeters or, in rare cases, 8 millimeters in thickness.

The other class of organs that help to make up the armor are the reproductive organs. These are borne on all parts of the surface of the trunks except, perhaps, in immediate connection with the terminal bud, which is exclusively an organ of growth. They are scattered about with very little order over the surface among the leaf scars. They are usually of a harder substance than that of the foliar organs and better adapted to resist erosive influences to which the fossil trunks are exposed. Where the trunks are worn, therefore, the reproductive axes are liable to protrude somewhat. Viewed from without, they usually present an organ with an elliptical cross section, the longer diameter being nearly horizontal, variable in size, but always larger than the leaf scars. The central portion is often wanting, and a funnel-shaped cavity less deep than the leaf scars takes its place. When the central portions are present they show markings having the form which the outer ends of the essential organs present, which is very variable and usually obscure. Surrounding the central portions are several rows of open scars arranged concentrically. These scars are sometimes triangular, quadrangular, polygonal, or nearly circular; but the most of them, especially the outer ones, are somewhat crescent-shaped, having the concave side toward the center. The inflorescence is a spadix surrounded by an involucre consisting of the concentrically arranged bracts or scales whose scars were last described. The spadix has a receptacle at the base, located near the inner surface of the armor and supplied with fibers from the axis. From the receptacle there rise two kinds of organs, first, peduncles or filaments, known in a few specimens to bear seeds and conjectured in one specimen to bear anthers at their summits, and, second, elongated chaff-like scales more numerous than the latter and rising above them, the upper portions expanding and forming a dense mat or covering over the essential parts. In most cases all these organs are wholly included in the armor, the only seeds that have thus far been found being deeply embedded in the tissues. The organs of inflorescence are probably axillary, but owing to the proximity of the leaf scars this is not generally apparent. In regions of the surface where they occur they usually crowd the leaf scars and cause variations in their shape. This effect is most marked on the upper sides of the scars, often quite obscuring or obliterating their normal features.

The axis of the trunk inclosed in the armor when complete consists of four parts, which, enumerated from without inward, may be denominated respectively as (1) the libro-cambium, (2) the parenchymatous wood, sometimes called the cortical parenchyma, (3) the wood proper or fibrovascular zone, and (4) the medulla or pith. In many cases the librocambium zone cannot be definitely distinguished from the cortical parenchyma, and nothing is visible but the large and numerous vascular bundles passing out from the interior into the leaves; but sometimes there occurs a definite line or thin zone of loose tissue immediately below the bases of the leaf stalks. There is usually a zone of apparently homogeneous cellular tissue, often of considerable thickness, filling the interval between the armor and the woody axis. The woody zone consists of one or more rings of exogenous tissue traversed by medullary rays. Where more than one, they are separated by thin interstices of parenchymatous tissue. The medulla is usually large and composed of coarse parenchyma.

Cycadeoidea Marylandica (Font.) Cap. and Solms.

1860. *Cycas* sp. Tyson, First Report State Agric. Chem. Maryland, p. 42.
1870. *Bennettites* sp. Carruthers, Trans. Linn. Soc. London, vol. XXVI, p. 708.
1879. *Cycadeoidea* sp. Fontaine, Am. Journ. Sci., 3d ser., vol. XVII, p. 157.
1889. *Tysonia Marylandica* Fontaine, Potomac or Younger Mesozoic Flora, Monogr. U. S. Geol. Survey, vol. XV, p. 193, pl. clxxiv–clxxx.
1892. *Cycadeoidea Marylandica* (Font.) Cap. and Solms, Mem. Real. Accad. Sci. Ist Bologna, ser. V, tom. II, pp. 179, 180, 186.

Trunks of medium or rather large size, almost always more or less laterally compressed so as to be elliptical in cross section, conical in shape or slightly narrowed near the base with a terminal bud set in a slight depression at the summit, simple, or in one specimen, apparently having one branch; mineral constitution very variable according to mode of preservation, but usually not hard, flinty, or heavy and compact; reddish, pinkish, drab, or ash colored; 25 to 45 centimeters high, 24 to 40 centimeters in longer and 12 to 26 centimeters in shorter diameter, with a girth of from 70 centimeters to one meter; organs constituting the armor proceeding at a right angle to the axis except above, where they are ascending, and near the base, where they are sometimes slightly descending; leaf scars arranged in two series of spiral rows crossing each other usually at a different angle to the axis of the trunk, the angle varying from 30° to 75°; scars usually subrhombic, *i. e.*, with the lateral angles nearly equal and the vertical ones unequal, the lower more acute than the upper, the latter often reduced to a mere groove or wanting entirely and the two upper sides together forming an arch, the whole scar simulating a drawn bow and bowstring, but sometimes triangular, the upper sides joined along a horizontal line, or more irregular in shape, occasionally with four curved sides and four acute angles; the width as represented by a line joining the two lateral angles varying from 15 to 25 millimeters, and the height as represented by a line joining the two vertical angles (which would rarely be parallel to the axis of the trunk) varying from 6 to 15 millimeters; remains of the petioles usually present in the scars at different distances from the summit, often bearing evidence of having been disarticulated at a natural joint, sometimes indicating the existence of two such joints at different depths in the scars, and showing that these joints consist of a diaphragm across the petiole which may remain after the substance of the petiole has partly decayed below it leaving a hollow space, portions of the outermost diaphragms also sometimes adhering to the sides of the scars in the form of a ridge surrounding them; vascular bundles rarely visible under an ordinary lens, but occasionally seen in the form of a row near the outer margin all round the leaf base with a few near the center; ramentum walls usually rather thick, but varying from less than 1 millimeter to 9 millimeters, ordinarily with a more or less distinct line marking the junction of the parts belonging to adjacent petioles (commissure), sometimes with a distinct plate or layer of less compact tissue between these, occasionally but rarely affected with pits or small bract scars especially in the angles; reproductive organs usually abundant, often solid and protruding, generally more or less distinctly marked in the center by the remains of the essential organs and surrounded by bract scars in several concentric rows, but often decayed in various degrees, leaving corresponding funnel-shaped cavities, commonly elliptical in cross-section, wider than high, very variable in size, the major axis 15 to 40 millimeters and the minor 10 to 30 millimeters; armor thin, 2 to 5 centimeters, usually joined to the internal parts by a clear line, but without measurable thickness, but sometimes very irregularly so joined and occasionally showing a thin libro-cambium layer; woody zone 3 to 10 centimeters thick, usually with two or three more or less distinct rings, the outer or parenchymatous zone thicker and firmer than the inner or fibrovascular zone; medulla usually homogeneous in structure, elliptical, the major axis 8 to 17 centimeters, the minor 3 to 9 centimeters.

Eighteen specimens are referred to this species. The type specimens are of course the originals of Tyson, of which the one photographed by him should stand at the head. I shall refer to it as No. 1 of the specimens at the Johns Hopkins University, although Professor Fontaine calls it No. 2. It is the largest and most perfect of the trunks belonging to this species. The other nearly perfect trunk of the original lot, which Professor Fontaine calls No. 1, will be referred to as "Johns Hopkins Cycads No. 2." The other two specimens described by Professor Fontaine were fragments, and were called by him "fragment No. 1" and "fragment No. 2." The first of these belongs to another species, as will be seen below. His "fragment No. 2" probably belongs to this species, but is somewhat anomalous. It will be referred to as "Johns Hopkins Cycads No. 3." A few years ago Professor Clark informed me that another specimen had been found about the University buildings, but he could give no further account of it. With his permission I have examined and described it and have had photographs made not only of this, but also of the other two fragments, which had not hitherto been illustrated. The newly found specimen, although not an entire trunk, is much more complete than either of the other fragments. It clearly belongs to this species, and will be referred to as "Johns Hopkins Cycads No. 5." The largest specimen in the Museum of the Maryland Academy of Sciences also belongs to this species, although it has suffered much from wear and many of the characters are obscured. It will be referred to as "Maryland Academy Cycads No. 1." The remaining thirteen specimens belong to the Woman's College and embrace the following numbers of the museum of that college: 1192, 1428, 1481, 1486, 1656, 1657, 3050, 3051, 3056, 3057, 3324, 3328, 3341. Many of these are fine specimens, consisting of nearly complete trunks, and of the specific identity of such there is no doubt, but there are several small and imperfect fragments, which scarcely show characters enough to render their specific assignment safe. In these and all similar cases I reserve the right to alter the assignment in case further study or future discovery shall seem to require it. The most important of these specimens is No. 1481, because, besides being a nearly perfect trunk, showing all the typical characters, it is the only one of Mr. Bibbins' specimens whose exact stratigraphical position is definitely determined.

Cycadeoidea Tysoniana n. sp.

Trunk medium sized or large, more or less compressed laterally; leaves slightly ascending; leaf scars arranged in spiral rows, 9 millimeters high, 22 millimeters wide, subrhombic, empty to some depth, petioles persistent at base, the vascular bundles arranged in one row near the exterior and a group near the center, often persisting after the decay of the remaining substance; ramentum walls thin, often with a layer of spongy substance in the middle, wrinkled on the edges; reproductive organs few and small; armor 5 centimeters thick; libro-cambium zone sometimes distinct, 3 millimeters thick; woody zone 6 to 8 centimeters thick, consisting of a broad outer parenchymatous layer 4 to 6 centimeters thick, and a narrow inner vascular zone 1 centimeter thick, the latter usually between open tissue without and within, its inner wall strongly marked with longitudinal grooves; medulla distinct and homogeneous, light and porous.

This species is represented only by a single specimen, No. 1472 of the Woman's College. It approaches *C. Marylandica* in some respects, but differs in the larger leaf scars, thinner walls, thicker armor, and the great paucity of reproductive organs. It is to be regretted that Professor Fontaine did not name the original species with which Mr. Tyson's name will always be so intimately connected in his honor instead of the genus, which must fall before the laws of nomenclature. I have endeavored in the above name to supply the defect in some small degree.

Cycadeoidea McGeeana n. sp.

Trunks low and flat, with ample diameter, sometimes three times as thick as high, yellowish, brown, or nearly black, more or less porous and spongy, and of low specific gravity; leaves and spadices set nearly at right angles to the axis; leaf scars arranged somewhat definitely in quincunx order and disposed in spiral rows around the trunk, small and uniform in shape, subrhombic with the vertical angles obtuse, the lateral ones acute, narrow-elongate, 6 to 10 millimeters in vertical by 16 to 20 millimeters in lateral dimensions, averaging 8 by 20 millimeters, usually empty by the disappearance of the leaf bases, at least to a considerable depth; ramentum walls thin, often less than one millimeter, with or without evident commissure, and with occasional punctations; axes of inflorescence few and scattering, sometimes projecting and filled with the substance of the spadix, sometimes cavitous from the decay of the essential organs, surrounded by obtusely triangular or somewhat crescent-shaped bract scars; armor 4 to 5 centimeters thick; liber and cambium sometimes distinguishable; woody zone usually divided into two or three rings; medulla large, porous.

A very distinct species of low and squat trunks, some of them having almost the form of a car wheel, only a very small part of which can be due to vertical compression. The external organs, however, closely resemble those of *C. Tysoniana*. It embraces seven specimens, all belonging to the Woman's College, as follows: Nos. 1471, 1659 and 1659*a*, which belong together, 3055, 3068, 3323, 3325, and 3349. The most complete specimen is No. 1471, which is taken as the type and which has been cut through vertically and the surfaces polished. The specimen consisting of the two complementary fragments 1659 and 1659*a* is also very interesting, though representing only about two-thirds of the whole trunk. The other specimens are all fragments.

I have named the species for Mr. W J McGee, by whom the Potomac formation was named and whose extensive studies in that formation are well known. As stated above, it was largely through his efforts that interest in the cycads of the formation was revived, and he it was who caused the photographs to be taken that were used to illustrate Professor Fontaine's monograph of the flora.

Cycadeoidea Fontaineana n. sp.

Trunks small and low, usually much compressed or flattened vertically, light brown to whitish in color, often spongy or porous and of low specific gravity; leaves and spadices set nearly at right angles to the axis; leaf scars not obviously arranged in spiral rows or imperfectly so arranged, variable and irregular in shape, usually with four angles and four curved sides, often in the form of a cross, rarely subrhombic, small, 8 to 12 millimeters in vertical and 14 to 25 millimeters in lateral measurement, averaging 10 by 19 millimeters; ramentum walls thick, 4 to 10 millimeters, usually without commissure or punctations; leaf bases rarely present, when so, spongy or porous without visible bundles; terminal bud (present in one specimen) 6 centimeters high, 65 millimeters broad at the downwardly convex base, definitely bounded below, symmetrically conical above, consisting of a mass of densely matted bracts imbricated along a central axis; reproductive organs few and imperfectly defined, usually cavitous in the center and sometimes surrounded by irregular-shaped bract scars; armor rather thin, 2 to 4 centimeters; liber and cambium obscure; woody axis divided into several rings, sometimes consisting of a loose, open structure separated by thin, firm plates, the inner face next the medulla definitely marked by the remains of vessels and medullary rays; medulla large, marked on the external surface by thin longitudinal ridges or lamellæ varying from 1 to 3 centimeters in length, the ends overlapping adjacent ones (*Cycadeomyelon* Saporta), internal parts coarse and porous or somewhat chambered.

This species resembles *C. McGeeana* in the general form of the trunks. but the external organs are very different. It embraces fifteen specimens, all but two of which belong to Mr. Bibbins' collection. The two smaller specimens in Museum of the Maryland Academy of Sciences have been somewhat doubtfully referred to this species. They are fragments, and show so few characters that their specific relations are obscure. The other specimens bear the following numbers of the Museum of the Woman's College of Baltimore: 1467, 1470, 1473, 1485, 1488, 1658, 3046, 3122, 3326, 3327, 3346, 3347, 3350. No. 1467 has been taken as the type of the species, although it does not show quite all the characters. It has the most perfect terminal bud in the entire collection, and a vertical section of the specimen has been made which passes through the center of the bud. There are two other specimens of special interest; one of these is No. 1470, which consists of a fine piece of the medulla, with its characteristic external markings (*Cycadeomyelon* of Saporta), to which is attached a portion of the armor and connecting tissues in such a manner as to show their relations. The other is No. 3046, called the "chicken trough" because so used by its owner at the time of its discovery. The large decayed cavity at the summit affords an excellent view of the structure of the internal parts. The remaining specimens are fragments of greater or less completeness.

In naming this species I have wished to commemorate the pioneer investigator of the deposits from which the cycads are derived and to whom science is indebted for the greater part of all that is known of the flora of these deposits.

Cycadeoidea Goucheriana n. sp.

Trunk large, cylindrico-conical with elliptical cross section, 30 to 50 centimeters high, 25 to 50 centimeters in diameter, light colored and of low specific gravity, somewhat chalky and friable; lower leaves somewhat deflexed, upper ones ascending, the line between the two definite and encircling the trunk near the middle; leaf scars arranged in two sets of spiral rows, both having nearly the same angle to the axis, 45° or greater; scars variable in size and shape, chiefly subrhombic to nearly triangular with curved or fluted sides, inner wall of the tubes marked by a raised line around it; scars averaging 11 millimeters in vertical and 23 millimeters in lateral measurement; leaf bases usually absent or only adhering to the bottom of the scars; ramentum walls thick, more or less divided into irregular laminæ or scales with fissures between them, their outer edges ragged; reproductive organs numerous, well marked, irregularly scattered over the surface, most abundant at the narrower sides, usually cavitous in the center, sometimes solid and protruding, surrounded by concentrically arranged crescent-shaped bract scars, sometimes well exposed and clearly distinguishable into spadix and involucre, the scales of the latter imbricated, the entire organ conical with the apex toward the axis of the trunk: armor 3 to 5 centimeters thick, separated from the wood by a definite line; woody zone 4 centimeters thick, consisting of an outer parenchymatous ring 3 centimeters thick, a thin ring of loose open structure, and two thin plates separated by another ring of coarse cells divided by radial partitions, the inner walls of both plates marked with the scars of the medullary rays, the pattern different in the two cases, the scars on the inner plate 13 millimeters long, those on the outer longer and tapering upward; medulla large, elliptical, tapering upward, of a coarse, homogeneous structure.

Only one specimen referable to this species has thus far been brought to light, but this is one of the most perfect and also one of the most beautiful of all that have been discovered in the Iron Ore beds. It is further of special interest from the circumstance that its exact stratigraphical and local position when found is so thoroughly vouched for that there is little room for doubt in the matter. It is with great pleasure that I name it in honor of Dr. John F. Goucher, president of the Woman's College of Baltimore, to whose liberal and munificent policy the entire collection is due.

Cycadeoidea Uhleri n. sp.

Trunks small, 28 centimeters high, 20 centimeters in diameter, 50 to 60 centimeters in girth at the thickest part, circular, or only slightly elliptical in cross section, conical or somewhat cylindrical-conical in shape, contracted at the base, silicified, but porous and light, reddish or gray in color; leaf scars definitely arranged in quincunx order and spiral rows around the trunk, one of these sets of rows ascending at an angle of 45° to the axis, the other at a much greater angle; subtriangular, the upper side arched and sometimes slightly grooved, lateral angles acute, inferior angle obtuse or rounded; scars uniform in size, 18 millimeters wide and 9 millimeters high; ramentum walls 4 to 5 millimeters thick, commissure distinct, the whole punctured with minute rhombic, triangular, or elliptical bract scars, deeply penetrating the structures; leaf bases usually wanting, but sometimes nearly filling the cavities; vascular bundles few, arranged in a row near the upper side of the petiole and others scattered over other parts; petioles all reflexed or pointing downward at a strong angle; reproductive organs numerous, situated directly over the leaf scars, *i. e.*, axillary, ellipical in outline, 15 millimeters wide, 10 millimeters high, the center occupied by the remains of the essential organs or by a circular cavity where these have disappeared; bract scars small and numerous, somewhat curved and arranged concentrically around the spadix, also passing out into the ramentum walls; armor 3 to 5 centimeters thick; woody zone 15 to 35 millimeters thick, divided into two or three rings; medulla about 5 centimeters in diameter, cylindrical or elliptical according to the shape of the trunk, heterogeneous in composition, being traversed by dike-like plates of a hard substance dividing it into chambers, often wanting, leaving a hollow center to the trunk.

Only two specimens are referable to this species, both of which agree almost exactly and show the distinct specific characters which so clearly separate it from all the others. The most perfect of these specimens was kindly sent me by Professor Uhler for comparison with the one in Mr. Bibbins' collection, which bears the number 1429 of the Museum of the Woman's College. This latter is a fragment freshly broken from a larger piece, which has not yet been recovered, although considerable is known of its history. It must have been taller than the perfect trunk and perhaps more cylindrical in shape. The other and almost complete conical trunk also has a history which I have not as yet sufficient data to record, but this much seems clear, that both these specimens were originally found at nearly the same spot.

No one has taken greater interest in the fossil cycads of Maryland than Professor P. R. Uhler, so long president of the Maryland Academy of Sciences and now Provost of the Peabody Institute of Baltimore, and it is fitting that this species should bear his name.

Cycadeoidea Bibbinsi n. sp.

Trunks large, 40 to 60 centimeters high, laterally compressed, girth of largest specimen 1 meter, of next in size 88 centimeters, shorter axis of cross section one half to two thirds of longer axis, contracted toward the summit, terminating in a conical bud 30 centimeters high, or, where this is wanting, in a concave depression, thoroughly silicified throughout, heavy and solid, of a dark color; all the organs of the armor nearly at right angles to the axis of the trunk; leaf scars arranged spirally around the trunk in imperfect quincuncial order, subrhombic, the lower angle much sharper than the upper, the latter sometimes reduced to a curve, 14 millimeters high, 26 millimeters wide; ramentum walls moderately thick, usually solid; vascular bundles of the petioles arranged in a row entirely around them and near the margin of a cross section, also sometimes a few near the center; spadices abundant, irregularly scattered over all parts of the surface, usually showing the marks left by the essential floral organs or a central cavity occupying their place, surrounded by curved or crescent-shaped pits concentrically arranged in several rows and set concave to the axis of the spadix, representing the involucral bracts; armor varying from 25 to 75 millimeters in thickness, this variation often great in different parts of the same specimen; cambium layer indistinct; liber zone not generally distinguishable from the wood; the latter in two or three zones, medullary rays faint; medulla well marked, homogeneous, usually spongy in appearance.

This species represents a type quite distinct from all the others, and the cycadean trunks of the Iron Ore deposits of Maryland might be divided into two classes, one of which should embrace all the forms included in the six species above described and the other those that have been referred to this species. The fact that the rock in the latter is always firm, hard, and heavy and usually dark colored is not merely an accident of preservation, but results in some obscure way from the nature of the vegetable tissues. The trunks are generally larger and the leaf scars much larger, though they have nearly the same form and arrangement. The reproductive organs are more abundant and usually very regular and definite in their character.

Eighteen specimens belong to this group, all but one of which are of Mr. Bibbins' collecting. The one exception is the fragment in the Museum of Johns Hopkins University that Professor Fontaine described as "Fragment No. 1," which I call No. 4. The most typical specimen is the great "Polly Jones Trunk," No. 1427 of the Museum of the Woman's College of Baltimore. The other sixteen in their numerical order are as follows: 1426, 1462, 1463, 1464, 1465, 1466, 1468, 1478, 1480, 1482, 1483, 1484, 1487, 3047, 3054, 3348. Of these, Nos. 1462, 1463, 1465, 1468, and 1482 are large, nearly perfect trunks, and Nos. 1463, 1468, and 1482 have the terminal bud preserved. The rest are fragments, but many of them are quite full and show important characters on the fractured surfaces that do not appear in the more complete specimens. No. 1483 has been cut through and the surfaces polished, and admirably shows the internal arrangements of the leaves, fruiting organs, and vascular strands supplying them. Nos. 1484 and 3054 give the maximum development of the leading characters, especially those of the fruiting organs.

In many respects this species represents the most important and interesting group of Maryland cycads, nearly all the specimens of which, as we have seen, having been secured by Mr. Bibbins, and I have therefore sought in causing the species to bear his name to make that name forever inseparable from the class of objects which he has done more than all others combined to bring out of their hiding places into the light of scientific investigation.

The above arrangement of the seven species of Cycadeoidea from the Iron Ore beds of Maryland is intended to be that of their affinities, as indicated by the characters described, taking the original *C. Marylandica* as the point of departure and concluding with the *C. Bibbinsi*, which exhibits the widest divergence from that norm. *C. Tysoniana*, *C. McGeeana*, and *C. Fontaineana* represent a somewhat gradual transition. *C. Goucheriana* and *C. Uhleri* represent abrupt divergences in different directions, while *C. Bibbinsi*, as already stated, constitutes a distinct group.

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REVISION OF THE COYOTES OR PRAIRIE WOLVES, WITH DESCRIPTIONS OF NEW FORMS.

BY C. HART MERRIAM.

It has been customary to regard the Coyote as a single species, inhabiting western North America from the plains of the Saskatchewan to the southern end of the tableland of Mexico, and from the fertile prairies of the Mississippi Valley to the Pacific coast. A somewhat hasty study of the material now in hand, however, shows that the name Coyote has not been applied to a single animal, but to an assemblage of species comprising three well marked subordinate groups and a considerable number of distinct geographic forms. The results of this and similar studies should serve as a word of caution to those who are in the habit of citing the wolves, cats, weasels, and other groups as 'species' whose ranges violate the laws of geographic distribution.

It is often assumed that wolves and other large animals have no fixed home, but roam at will over enormous areas, the mothers stopping to give birth to and care for their young wherever chance finds them at the time. Except in the case of certain gregarious Ungulates, as the Buffalo, this belief is opposed to the laws of geographic distribution and the known facts respecting the breeding habits and 'home instincts' of animals. It is of course true that wolves which hunt in packs and follow moving herds travel relatively great distances, and that in winter they perform regular migrations and also roam irregularly over large tracts of country in search of food; but even these movements have geographic limitations, as proved by the constancy with which particular geographic forms are found within particular areas. Thus the snow-white Arctic Wolf never reaches the northern border of the United States, no matter how severe the winter, and the Red Wolf of Texas is unknown on our northern plains. In the case of the Coyote the present study goes far to show that except in winter, when migratory movements take place, the distances traveled by individual wolves are not sufficient to prevent the various species and subspecies from conforming to the faunal zones. It must be expected, however, that the belts of overlapping between the several zones will be broader in the case of such wide ranging animals as wolves than in the case of those whose means of locomotion are more limited.

The three groups of Coyotes have distinctive geographic ranges which conform to the well known life zones. Beginning at the north, they may be known as (1) the *latrans* group, inhabiting the Upper Sonoran and Transition zones and the southern edge of the Boreal; (2) the *frustror* group, inhabiting the Lower Sonoran of Texas (and probably Oklahoma and Indian Territory), the tableland of Mexico (at least its southern part), and the peninsula of Lower California, and (3) the *microdon* group, inhabiting the Arid Tropical belts of both coasts of Mexico and the lower Rio Grande region of Texas, and also the Lower Sonoran deserts of Arizona, Nevada, Utah, and California. *Canis latrans* is the largest of the Coyotes and has the largest teeth; *C. frustror* and its allies are of medium or rather large size and have somewhat smaller teeth; *C. microdon* and its relatives are smaller and have very much smaller teeth.

The eleven forms here recognized, with their type localities, are as follows:

1. LATRANS GROUP.
    - *Canis latrans* Say. Council Bluffs, Iowa.
        - *pallidus* nob. Johnstown, Nebraska.
        - *lestes* nob. Toyabe Range, Nevada.
2. FRUSTROR GROUP.
    - *Canis cagottis* H. Smith. Rio Frio, near city of Mexico.
        - *frustror* Woodhouse. Fort Gibson, Indian Territory.
        - *peninsulæ* nob. Cape St. Lucas, Lower California.
3. MICRODON GROUP.
    - *Canis microdon* nob. Mier, Tamaulipas, Mexico.
        - *mearnsi* nob. Quitobaquita, Pima County, Arizona.
        - *estor* nob. San Juan River, Utah.
        - *ochropus* Esch. 'California' (San Joaquin Valley).
        - *vigilis* nob. Manzanillo, Colima, Mexico.

GEOGRAPHIC DISTRIBUTION AND INTERRELATIONS.

The material available for the present study is insufficient to admit of mapping the boundaries of the areas inhabited by the several forms, of describing the seasonal differences in pelage, or of determining which members of each group do and which do not intergrade; hence all are here treated as species. This much, however, may be said with considerable confidence: *Canis latrans* inhabits the humid prairies and bordering woodlands of the northern Mississippi Valley in Iowa and Minnesota, and follows the northern edge of the plains westward to the base of the Rocky Mountains in the province of Alberta. On the adjacent arid plains from eastern Colorado to Montana and Assiniboia it is replaced by and probably intergrades with the very pale *C. pallidus.* In cranial characters *C. pallidus* is closely related to the form inhabiting the plains of the Columbia in eastern Oregon and Washington, which appears to grade insensibly into *C. lestes*, the Coyote of the Transition zone from the dry interior of southern British Columbia, Washington, and Oregon southward over the higher lands of the Great Basin, the Sierra Nevada, and the Rocky Mountains to the plateau of northern Arizona, and thence along the continental divide to the Mexican boundary. It is not improbable, therefore, that the three members of the *latrans* group intergrade, though no skins showing intergradation have been seen.

The three members of the *frustror* group, on the other hand, are probably specifically as well as geographically distinct. Still, the limits of their ranges are unknown. *Canis frustror* inhabits the Gulf region of Texas from Nueces Bay northward and will probably be found throughout the Lower Sonoran area of Texas, Oklahoma, and Indian Territory. Its distant relative, *C. cagottis*, is known from only the southern part of the tableland of Mexico, but probably ranges northward along the west side of the tableland. The third member of the series, *C. peninsulæ*, is supposed to be restricted to the peninsula of Lower California.

The *microdon* group contains five very different forms. Of these, *C. microdon* inhabits the arid tropical or 'Tamaulipan' fauna of northeastern Mexico and the Lower Rio Grande region in Texas; *C. vigilis* the arid tropical coast region of Colima in western Mexico; *C. mearnsi* the Lower Sonoran areas of northern Sonora and southern Arizona; *C. estor* the adjacent Lower

Sonoran deserts of eastern California, Nevada, and Utah, and *C. ochropus* the Lower Sonoran San Joaquin Valley of California. Apparently the only forms in this series which can possibly intergrade are *C. mearnsi* and the pallid *C. estor.*

It should be observed that two of the groups—the *latrans* and the *microdon*—have each a pallid representative, and that these representatives (*pallidus* and *estor*) resemble one another externally so closely that they are hardly distinguishable except by size, while a glance at their teeth shows that they belong to opposite extremes of the whole series. It is not impossible that the third (or *frustror*) group also has a pallid member, but no specimens from the southern plains have come to hand.

Good skins with skulls are much needed from all parts of Mexico, Texas, Indian Territory, Oklahoma, New Mexico, southern Colorado, western Arizona, the Painted Desert in eastern Arizona, the coast ranges of southern California, eastern North Dakota, Manitoba, and the northwest coast region. The pelage is in best condition in early winter immediately after the fall molt, usually in December and January.

HISTORY AND NOMENCLATURE.

Fortunately the Coyotes have escaped the complicated history and involved synonymy with which most groups are encumbered. This is due in the main to the widespread belief that all of the small wolves of North America belong to a single species.

So far as I have been able to ascertain, only four names have been proposed for the Coyotes. These are *Canis latrans* Say, 1823, for the Upper Mississippi Valley animal; *Canis ochropus* Eschscholtz, 1829, for the species from the interior of California; *Canis frustror* Woodhouse, 1851, for the Indian Territory (and Texas) animal; and *Lyciscus cagottis* Hamilton Smith, 1839, for the one from the southern end of the tableland of Mexico. All of these names are here recognized as designating valid forms.

GENERAL CHARACTERS.

The pattern of coloration is the same in all the Coyotes. Except in the pale desert forms (*pallidus* and *estor*), in which the fulvous tints are replaced by buff, the muzzle, backs of the ears, outer side (sometimes the whole) of the fore and hind feet and legs, and distal half of the under side of the tail are some shade of fulvous. The ground color of the back also varies from buff, or even buffy-white in the desert forms, to dull fulvous in the animal from southern Mexico, and the abundance of black-tipped hairs is usually proportionate to the intensity of the ground color. The upper side of the tail is like the back, and about one-third the distance from root to tip it is marked by an elongated black spot. The tip is always black, although it sometimes contains a tuft of white hairs, most often present in *C. ochropus.* The males are decidedly larger than the females.

Compared with the large Wolves, the Coyotes are slender, lithe, and graceful.* They are swift of foot, and in ordinary seasons feed chiefly on rabbits, both jackrabbits and cottontails, but they also catch ground squirrels and other small mammals, snakes, lizards, birds, and insects, and when put to it by hunger do not hesitate to eat carrion. They are also fond of fruit.

Unless the contrary is stated, all of the measurements in the present paper were taken 'in the flesh' by the collector. All are in millimeters.

DESCRIPTIONS OF SPECIES.

Canis latrans Say.

Canis latrans Say, Long's Expedition to Rocky Mountains, I, 168, 1823.

Type locality.—Council Bluffs, Iowa.

Characters.—Size largest of the Coyotes; coloration rather pale; premolar and carnassial teeth very large and greatly swollen.

Color.—Muzzle dull and rather pale fulvous, finely sprinkled with gray hairs (chiefly above) and with black hairs (chiefly on cheeks); top of head from front of eyes to ears grizzled gray, the pale fulvous zone of under fur showing through, but the gray predominating; ears deep rich fulvous, sparingly sprinkled with black hairs; upper parts from ears to tail coarsely mixed buffy gray and black; under parts and upper lip whitish; long hairs of throat sparingly tipped with blackish, giving the broad collar a grizzled appearance; fore legs and feet dirty whitish, becoming dull clay color on outer side of leg; hind legs and feet dull fulvous on outer side, white on inner side and on dorsal surface of feet, the change from fulvous to white rather abrupt; tail narrowly tipped with black; its under side whitish basally, becoming pale fulvous on distal half and tipped and edged with black.

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* It is hoped that no one will be misled, either as to the form or coloring of the Coyotes, by the gross caricature bearing their name in Mivart's recent 'Monograph of the Canidæ.'

Cranial and dental c[illegible] [illegible]u l* and teeth, particularly the la[illegible] largest of the grou[illegible] latter than in the other forms; premola[illegible] very much swolle[illegible] [illegible]ly the lower ones; carnassial teeth very thick and tumid. [illegible] [illegible]y Coyotes whose skulls approach *C. latrans* in size are *pallidus*, *l*[illegible] [illegible]*ustror*, and *ochropus*. The two latter may be dismissed at once o[illegible] [illegible]ount of the great disparity in the teeth, the carnassials and premol[illegible]s being hardly more than two-thirds as large as those of *latrans*. *C. frustror* differs further in having the frontals more elevated than in any other member of the group, while in *C. latrans* they are the flattest and most depressed. Large male skulls of *C. ochropus* sometimes have the rostrum (measured from back of last molar to front of incisors) of the same length as small males of *latrans*, but the rostrum is always very much narrower and the postpalatal part of the skull smaller. The difference between *latrans* and *ochropus* in size of teeth is very great, the upper carnassial and first molar together measuring 35 millimeters in an adult male *latrans*, contrasted with 30 in an adult male *ochropus* having the entire tooth row of exactly the same length. In *C. latrans* the premolars are so large that the tooth row is crowded, while in *ochropus* they are widely spaced. The teeth of the female *latrans* are decidedly larger than those of the male *ochropus*.

The species having teeth sufficiently large to require comparison with *latrans* are *pallidus* and *lestes*. In both of these the lateral teeth of the male equal or exceed those of the female *latrans*. Comparing skulls of the same sex, the upper carnassial and first molar and the premolars in both jaws, particularly the lower, are larger, more swollen, and more crowded in *latrans*. In *latrans* also the inner cusp (*protocone*) of the upper carnassial averages decidedly larger than in either of the others.

Measurements.—Female young adult from Elk River, Minnesota: total length, 1219; tail vertebræ, 394; hind foot (in dry skin), 179.

Cranial measurements.—♂ adult from Elk River, Minnesota: basal length, 190; basilar length of Hensel, 186; zygomatic breadth, 109; palatal length, 96; mastoid breadth, 65; length of crown of upper carnassial tooth, 22. The skull of an adult female from Elk River measures: basal length, 175; basilar length of Hensel, 172; zygomatic breadth, 100; palatal length, 96; mastoid breadth, 62; length of crown of upper carnassial tooth, 20.5.

Canis pallidus sp. nov.

Type locality.—Johnstown, Brown County, Nebraska. Type No. 77093, ♂ young adult, U. S. National Museum, Department of Agriculture collection. Collected March 12, 1896, by E. E. Fast.

Characters.—Similar to *C. latrans*, but everywhere paler; backs of ears buff instead of fulvous; skull and teeth smaller.

Color.—Muzzle dull ochraceous buff; top of head grizzled grayish faintly tinged with buff; ears buff; upper parts pale buffy whitish or soiled white

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* The skulls of *C. latrans* used in the present comparison are from Elk River, Minnesota.

[illegible]ringly mixed with black hairs, especiall [illegible] f the ta[illegible]dle of back; under parts white; no distinct collar (long hairs [illegible] ck als[illegible] noticeably tipped with black); fore and hind legs and feet so[illegible] to d[illegible] with faint buffy suffusion on outer side of fore legs, and tinged w[illegible] st fulvous on outer side of hind legs; tail pale, under side white basal[illegible] coming buff, and narrowly tipped with black.

Cranial and dental characters.—Skull and teeth similar to those of *C. latrans*, but slightly smaller. The lower premolars and carnassial and the upper carnassial and first molar are decidedly smaller and less swollen than in *latrans*.

Remarks.—*C. pallidus* is a pale arid-land representative of *latrans*. It inhabits the Great Plains from eastern Colorado northward into Canada, and is common throughout Montana except in the mountains. On the southern plains, from eastern Colorado southward, it is replaced by another species. Specimens of both have been obtained at Arkins, Colorado.

Measurements.—Unfortunately we have no flesh measurements of the type specimen, but the hind foot (dry) measures 77 millimeters. The form averages a little smaller than *C. latrans*.

Cranial measurements.—(♂ adult, Johnstown, Nebraska.) Basal length, 177; basilar length of Hensel, 173; zygomatic breadth, 100; palatal length, 93; mastoid breadth, 63.5; length of crown of upper carnassial tooth, 21.

Canis lestes sp. nov.

Type locality.—Toyabe Mountains near Cloverdale, Nevada. No. $\frac{24552}{32347}$, ♂ adult, U. S. National Museum, Department of Agriculture collection. Collected November 21, 1890, by Vernon Bailey. Original No. 2223.

Geographic distribution.—Transition and Upper Sonoran areas from the Rocky Mountains westward, and from the arid interior of British Columbia (Aschroft, Shuswap) southward over Washington and Oregon, and the mountains farther south to the plateau region of northern Arizona and New Mexico, and thence southward along the continental divide to the Mexican boundary. In California *C. lestes* inhabits the coast ranges about San Luis Obispo and probably elsewhere, as well as the Sierra Nevada, and in winter it wanders out over the deserts, invading the range of *C. estor*.

Characters.—Size large (next to *latrans*); ears and tail large; coloration almost as in *latrans;* cranial characters as in *pallidus*, but skull and teeth averaging somewhat larger.

Color.—Muzzle very pale cinnamon rufous; top of head from a little in front of eyes to ears grizzled gray and ochraceous; crown, nape, and ears fulvous, deepest on ears; rest of upper parts grayish buffy mixed with black hairs (general effect slightly paler than in *latrans*); underparts whitish, more or less suffused with buffy across middle of belly; long hairs of throat conspicuously tipped with black, forming a broad 'ruff'; fore and hind legs and feet buffy-ochraceous on outer side, whitish on inner side and on upper surface of hind feet; tail broadly tipped with black; its lower surface whitish on basal third; ochraceous on distal two-thirds, the hairs of terminal third moderately tipped with black, th black increasing toward black end of tail.

Cranial and dental characters.—Skull and teeth clearly of the *pallidus* type; premolar and carnassial teeth smaller and less swollen than in *latrans.* Compared with *C. ochropus*, the skull and teeth are larger and more massive and the rostrum is much broader. A much closer resemblance exists between *C. lestes* and the broad-muzzled *peninsulæ* and *frustror.* Contrasted with *peninsulæ*, the skull is somewhat larger and the teeth heavier; contrasted with *frustror*, the skull is smaller (decidedly shorter), more massive, the frontals flatter and less elevated posteriorly, and the teeth very much larger.

Remarks.—Externally *Canis lestes* resembles *C. latrans*, being much more highly colored than its nearest relative, *C. pallidus.* On the other hand, it is decidedly paler than either *peninsulæ* or *frustror.* Its ears are larger than those of *pallidus* and *frustror*, but smaller than those of *peninsulæ.*

Measurements.—Type specimen, ♂ adult: total length, 1116; tail vertebræ, 320; hind foot, 200.

Cranial measurements.—Type specimen, ♂ adult, rather old: basal length, 170; basilar length of Hensel, 166; zygomatic breadth, 102;* palatal length, 88; mastoid breadth, 62; length of crown of upper carnassial tooth, 21.5.

Canis frustror Woodhouse.

Canis frustror Woodhouse, Proc. Acad. Nat. Sci. Phila., V, 147, 1851.

Type locality.—Fort Gibson, at junction of Neosho River with the Arkansas, Indian Territory.

Characters.†—Similar to *C. peninsulæ*, but somewhat larger; colors paler, ears shorter, rostrum longer.

Color.—Muzzle cinnamon rufous; space between eyes and reaching half way to ears grizzled gray and fulvous; top of head, nape, and ears pale fulvous, deepest on the ears; rest of upper parts buffy-ochraceous, profusely mixed with black; under parts whitish, with a strong buffy-ochraceous suffusion across middle of belly; long hairs of throat conspicuously tipped with black, the black hairs running back over breast along median line; fore and hind legs and feet fulvous all round, deepest on outer side; upper surface of forearm and feet abundantly mixed with black, which forms an almost continuous stripe; antero-external face of thigh well sprinkled with black hairs which reach down more than half way to heel; under side of tail fulvous, white basally, and with hairs of distal half conspicuously tipped with black.

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* The skull of the type is unusually broad across the zygomata. The normal zygomatic breadth in adult male skulls is about 97.

† The present description is from a specimen from Padre Island, Texas, which is unquestionably paler and less red than the animal of the interior. Audubon describes one from San Antonio, Texas, as having the neck reddish brown, "with bars under the throat and on the chest and belly of a reddish tinge." The type specimen of *C. frustror* is in the National Musuem and, as pointed out by Baird, is hardly half grown.

Cranial and dental characters.—Skulls from Padre Island and Nueces Bay are similar to those of *C. peninsulæ* from Lower California, except that they are somewhat larger, have decidedly longer rostrums and more elevated frontals. The elevation of the frontal shield posteriorly is greater than in any other Coyote. The teeth, though relatively smaller, are almost as large as in *peninsulæ*. In the Nueces Bay skulls the upper carnassial is peculiarly swollen and rounded anteriorly, with the inner cusp set back considerably behind the anterior plane of the tooth.

Remarks.—*Canis frustror* (assuming the name to apply to the Padre Island specimen above described) resembles *C. peninsulæ* from Lower California in general characters, differing chiefly in somewhat larger size, paler coloration, shorter ears, larger amount of black on forearm, and longer rostrum.

Measurements.—♂ young adult, Padre Island, Texas: total length, 1190; tail vertebræ, 320; hind foot, 200.

Cranial measurements.—♂ adult from Padre Island, Texas: basal length, 182; basilar length of Hensel, 179; zygomatic breadth, 102; palatal length, 94; mastoid breadth, 63; length of crown of upper carnassial tooth, 19.

Canis cagottis (Hamilton Smith).

Lyciscus cagottis Hamilton Smith, Jardine's Nat. Library, Mammals, vol. IV, 164, 1839.

? *Canis nigrirostris* Licht., Abhandl. K. Akad. Wiss., Berlin (1827), pp. 105–106, 1830.

Type locality.—Rio Frio, between City of Mexico and Puebla, Mexico.

*Characters.**—Similar to *C. peninsulæ*, but slightly larger and redder, with somewhat shorter ears, larger teeth, and broader rostrum.

Color.—Muzzle bright ferruginous; top of head grizzled buffy-grayish and fulvous, the fulvous predominating, especially posteriorly; crown, nape, and ears fulvous, deepest on the ears; rest of upper parts grizzled fulvous, buffy, and black (the black-tipped hairs worn off in the Cerro San Felipe specimen, but probably very abundant and conspicuous in winter pelage); fore legs and feet dull fulvous, with very little black over wrists; hind legs and feet deep fulvous on outer side, the legs abruptly whitish on inner side and feet much paler on upper surface; under surface of tail fulvous, whitish basally; hairs of terminal third black-tipped.

Cranial and dental characters.—The skull of the adult male from Cerro San Felipe agrees with that of the type specimen of *Canis peninsulæ* in size and general cranial characters, but has the base of the rostrum very much thicker and more swollen, a broader and shorter palate (remarkably broad posteriorly), broader interpterygoid fossa, and much shorter mandible, which is strongly bellied under the carnassial and molars. The teeth are larger and heavier, particularly those of the lower jaw. The upper carnassial is much more swollen and broadly rounded anteriorly, with a relatively insignificant inner cusp (*protocene*). The first upper molar is very large and broad and is broadly rounded on the inner side, without the posterior emargination of *C. peninsulæ*. The last upper molar is subquadrate and in contact with the first for nearly half the length of the anterior face. The lower premolars and carnassial are much larger, heavier, and more crowded than in *peninsulæ*, but the posterior molar is minute on one side and absent on the other (without trace of alveolus). A very young skull from the volcano of Toluca, which has not shed the milk teeth, has enormous audital bullæ; but very young skulls of wolves always have larger bullæ than adults.

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*The present description is based on a specimen (♂ adult) from the Cerro San Felipe, Oaxaca, Mexico, in summer pelage.

Remarks.—Hamilton Smith's original description of *cagottis* is as follows: "The Caygotte of the Mexican Spaniards, and most probably the Coyotl of the native Indians, is a second species, but slightly noticed by travelers. Mr. William Bullock observed it near Rio Frio, in the Mexican Territory, and was informed by muleteers then with him that it was the Caygotte, a very fierce kind of wolf. The individuals he saw were in size equal to a hound, of a brownish rusty gray, with buff-colored limbs, and rather a scanty brush." While there is nothing distinctive about this description, it may be assumed, on geographic grounds, to apply to the animal from the Cerro San Felipe. For the same reason one would expect Lichtenstein's *C. nigrirostris* to belong here also; but Lichtenstein states that his animal has a black muzzle and short pointed ears, characters not possessed by any Coyote known to me. Lichtenstein's specimen was collected by Deppe at Real de Arriba, in the State of Mexico. If its skull is still in the Berlin Museum, its relations to the Cerro San Felipe skull may be easily ascertained. If not a freak it may be the large wolf of southern Mexico.

Measurements.—Adult ♂ from Cerro San Felipe, Oaxaca: total length, 1132; tail vertebræ, 304; hind foot, 195.

Cranial measurements.—Adult ♂ from Cerro San Felipe: basal length, 164; basilar length of Hensel, 160; zygomatic breadth, 98; palatal length, 84; mastoid breadth, 59; length of crown of upper carnassial tooth, 21.

Canis peninsulæ sp. nov.

Type locality.—Santa Anita, Cape St. Lucas, Lower California. Type No. 74245, ♂ adult, U. S. National Museum, Department of Agriculture collection. Collected May 15, 1895, by J. E. McLellan.

General characters.—Similar to *C. ochropus* in size, large ears, and rich coloration, but colors darker and redder, underside of tail blacker; belly marked with black-tipped hairs; rostrum much broader.

Color.—Muzzle cinnamon rufous, the cheeks abundantly mixed with black hairs, almost forming a black patch under eyes; top of head grizzled grayish fulvous, mixed with black hairs between and above eyes; ears rich fulvous; upper parts buffy-ochraceous profusely mixed with black (under fur pale fulvous); underparts strongly washed with buffy-ochraceous or even pale fulvous, with numerous black-tipped hairs between fore legs and along middle of belly; long hairs of throat forming a strongly marked collar, tinged with buffy and conspicuously mixed with black-tipped hairs; fore and hind legs and feet fulvous; underside of tail fulvous, whitish basally; distal half with long hairs conspicuously tipped with black, forming a black veil over the fulvous.

Cranial and dental characters.—The skull which *Canis peninsulæ* resembles most closely is an adult male from the Cerro San Felipe, State of Oaxaca, Mexico, assumed to belong to the species named *cagottis* by Hamilton Smith. The skull of the type specimen of *peninsulæ* agrees with the Cerro San Felipe skull essentially in size and general characters, but the rostrum is not so short and broad (in the Cerro San Felipe skull it is remarkably broad posteriorly), and the lateral teeth, though large, are uniformly smaller and less swollen. The difference is most marked in the lower jaw. Compared with *C. frustror* from Texas, the skull of *peninsulæ* is shorter, the frontal shield lessel evated posteriorly, and the lateral teeth larger. Compared with its neighbor from the interior of California, *C. ochropus*, the rostrum is very much broader, the whole skull heavier and more massive, the horizontal ramus of the mandible deeper and more 'bellied,' and the lateral teeth larger and thicker.

Cranial measurements.—Type skull, ♂ adult: basal length, 169; basilar length of Hensel, 167; zygomatic breadth, 99; palatal length, 90; mastoid breadth, 57; length of crown of upper carnassial tooth, 20.5.

Canis microdon sp. nov.

Type locality.—Mier, on Rio Grande River, State of Tamaulipas, Mexico. No. $\frac{27555}{39654}$, ♂ adult, U. S. National Museum, Department of Agriculture collection. Collected April 28, 1891, by William Lloyd. Original No. 478.

Characters.—Size small; coloration rather dark; upper surface of hind foot whitish; belly sprinkled with black-tipped hairs; carnassial and molar teeth very small.

Color.—Muzzle pure cinnamon rufous; top of head grizzled grayish and ochraceous; ears fulvous; rest of upper parts buffy-ochraceous, profusely mixed with black hairs (under fur buffy or buffy-ochraceous); under parts whitish between fore legs and between thighs; middle of belly buffy, with black-tipped hairs extending all the way across and also reaching forward along median line to long hairs of throat, which latter are strongly marked with black-tipped hairs; fore legs and feet fulvous, becoming whitish on inner side of leg; upper side of forearm strongly mixed with black; hind legs and feet pale fulvous on outer side, changing to white on inner side of leg and upper surface of foot; under side of tail pale buffy fulvous, whitish at base, and with hairs of distal half broadly tipped with black.

Cranial and dental characters.—Skull short and broad; muzzle and palate exceedingly short and broad; teeth small, particularly the carnassial and first upper molar.

Remarks.—*Canis microdon* does not require close comparison with any known wolf. From its nearest relative, *C. mearnsi*, it differs in shorter rostrum, smaller upper carnassial, and more emarginate first upper molar. Externally it differs from *mearnsi* conspicuously, the upper parts being darker and the fulvous tints deeper, duller, and less extensive. In *mearnsi* the whole of the legs and feet are bright orange-fulvous. In *microdon* the white of the under parts reaches down on the inner side of the legs all the way to the wrists and ankles, and the upper surface of the hind feet is white.

Canis microdon is distantly related to *C. vigilis*, of the southwest coast of Mexico, but it differs from *vigilis* in numerous and important characters. The palate is shorter and broader, and the carnassial and molar teeth of the male are about the size of those of the female *vigilis*. The external differences are even more marked. The sides of the face lack the conspicuous black hairs of *vigilis;* the under fur of the back is buffy or pale buffy-ochraceous instead of fulvous; the belly is white and buffy, abundantly mixed with black-tipped hairs instead of everywhere saturated with fulvous; the fulvous of the fore and hind legs is pale and less extensive; the black of the forearm less extensive; the color of the hind legs and feet entirely different: the outer side only of the hind leg is fulvous, the inner side being white and the upper surface of the hind foot white or whitish. In *vigilis* the hind legs and feet are deep fulvous all round. The hairs of the distal half of the tail are broadly tipped with black, while in *vigilis* they are fulvous throughout.

Measurements.—Type specimen, ♂ adult: total length, 1070; tail vertebræ, 320; hind foot, 186; weight, 28 pounds.

Cranial measurements.—Basal length, 161; basilar length of Hensel, 158; zygomatic breadth, 93.5; palatal length, 84; mastoid breadth, 57; length of crown of upper carnassial tooth, 16.5.

Canis mearnsi* sp. nov.

Type locality.—Quitobaquita, Pima County, Arizona. No. 59899, ♂ young adult, U. S. National Museum. Collected February 5, 1894, by Dr. Edgar A. Mearns. Original No. 2925.

Characters.—Size small; ears medium; coloration rich and bright, the fulvous tints exceedingly bright and covering the whole of the fore and hind legs and feet. Skull and teeth small.

Color.—Muzzle cinnamon rufous; space between eyes grizzled grayish and fulvous; top of head, nape, and ears rather light fulvous; rest of upper parts buffy-ochraceous bountifully mixed with black-tipped hairs (under fur bright buffy-ochraceous); under parts in pectoral and inguinal regions whitish, middle part of belly suffused all the way across with buffy-ochraceous; throat buffy, the long hairs black-tipped; fore and hind legs and feet bright orange-fulvous all round; upper side of fore legs moderately mixed with black; underside of tail pale fulvous, whitish at very base, hairs of distal half black-tipped; extreme end of tail black, usually with a few white hairs.

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* Named in honor of Dr. Edgar A. Mearns, U. S. A., whose name will always be associated with the mammals of the Mexican boundary, and through whose courtesy I am indebted for the opportunity of describing the species.

Cranial and dental characters.—Skull and teeth small and light as in *C. estor;* a little larger than in *C. microdon* from Mier, Tamaulipas.

Remarks.—*Canis mearnsi* is the handsomest of the Coyotes. It differs from *C. microdon* of the Lower Rio Grande region in slightly larger size and in the greater extent and much brighter tints of the fulvous parts. The fore and hind legs and feet are bright orange-fulvous all round; in *C. microdon* the fulvous is deeper and duller and the white of the inguinal region reaches down on the inner side of the hind leg to the ankle and covers the upper surface of the foot, and in the fore leg a white stripe reaches all the way down the posterior aspect of the leg to the wrist. Compared with *microdon*, the throat and middle part of the belly are more ochraceous and have fewer black-tipped hairs—the belly practically none. The skull and teeth of *mearnsi* are almost exactly like those of *estor*, but in coloration the two animals differ so widely as to require no comparison. Nevertheless, specimens collected by Dr. Mearns at Tinajas Altas, Arizona, are so much paler than typical *mearnsi* as to suggest intergradation.

Measurements.—Female adult from type locality: total length, 1100; tail vertebræ, 330; hind foot, 180 (measured in flesh by Dr. Mearns).

Cranial measurements.—Type specimen, ♂ young adult, not fully grown: basal length, 163; basilar length of Hensel, 160; zygomatic breadth, 83; palatal length, 88; mastoid breadth, 56.5; length of crown of upper carnassial tooth, 19.

Canis estor sp. nov.

Type locality.—Noland's ranch, San Juan River, Utah. No. 57141, ♀ adult, U. S. National Museum, Department of Agriculture collection. Collected November 20, 1893, by J. Alden Loring. Original No. 1379.

Characters.—Size small; coloration pale, but not quite so pale as in *pallidus;* carnassial and molar teeth small.

Color.—Muzzle exceedingly pale fulvous; top of head grizzled grayish and ochraceous buffy; ears and nape ochraceous buff; upper parts buffy, sparingly mixed with black hairs; under parts whitish; long hairs of throat conspicuously black-tipped; some black-tipped hairs along median line of breast; outer side of fore legs bright buff, pale on inner side and on fore feet; outer side of hind legs and feet buffy-ochraceous; inner side of hind leg and upper surface of hind foot white or whitish; under side of tail ochraceous, becoming white basally, the hairs of distal half conspicuously tipped with black; black tip short.

Cranial and dental characters.—Skull and teeth similar to those of *C. mearnsi*, but lateral teeth slightly larger. Compared with typical *ochropus*, the rostrum is somewhat more swollen in the females and conspicuously more in the males.

Remarks.—*Canis estor* bears the same relation to *C. mearnsi* that *pallidus* does to *latrans.* Both are pale desert forms, slightly smaller than the species from which they have been derived. The collection of the Biological Survey contains specimens of *C. estor* from the Mohave Desert, Death Valley, the Panamint and Inyo ranges, Owens Valley, the San Juan in southeast Utah, Flowing Springs and Humboldt Wells, Nevada, and Playa Maria Bay, Lower California. The latter are not typical.

Measurements.—Type specimen, ♀ adult: total length, 1052; tail vertebræ, 300; hind foot, 179. Measurements of an adult male from Granite Well (base of Pilot Knob), Mohave Desert: tail vertebræ, 340; hind foot, 195.

Cranial measurements.—Type skull, ♀: basal length, 159; basilar length of Hensel, 155; zygomatic breadth, 89; mastoid breadth, 57; palatal length, 84; length of upper carnassial, 17.2

Canis ochropus Eschscholtz.

Canis ochropus Eschscholtz, Zoöl. Atlas, III, pp. 1–2, pl. 11, 1829.

Type locality.—'California.' (Specimens from Tracy, San Joaquin County, California, assumed to be typical.)

Characters.—Externally similar to *C. latrans* and *lestes*, but smaller, darker, and much more highly colored, with very much larger ears, and very much smaller skull and teeth.

Color.—Muzzle dull grizzled cinnamon rufous; top of head grizzled grayish fulvous; ears rich fulvous; nape sometimes fulvous; rest of upper parts buffy-ochraceous, profusely mixed with black hairs; under parts usually whitish, with a soiled yellowish wash across middle of belly, but sometimes suffused with pale fulvous; long hairs of throat strongly grizzled with black-tipped hairs, forming a conspicuous 'ruff,' the black-tipped hairs sometimes following the median line over the breast; fore and hind legs and feet dull fulvous all round, but paler on inner side and most intense on outer side of hind leg; upper side of forearm strongly marked with black; outer side of thighs strongly grizzled with black-tipped hairs; under side of tail pale fulvous, white basally, and tipped and edged with black; hairs of terminal third of under side of tail usually black tipped; extreme tip often white.

Cranial and dental characters.—The skull of *Canis ochropus* is disproportionally large for the size of the teeth, and the rostrum is long and slender. Compared with *C. estor*, probably its nearest relative, the skull is slightly larger, the rostrum decidedly longer and more slender, and the teeth very slightly larger. Compared with its neighbor, *C. lestes*, with which the skull agrees essentially in length, the entire cranium is narrower, particularly the rostrum, and the lateral teeth are so much smaller as to need no comparison.

Measurements.—Average of four females from Tracy, California: total length, 1110; tail vertebæ, 295; hind foot, 180.

Cranial measurements.—♂ adult, Tracy, California: basal length, 177; basilar length of Hensel, 174; zygomatic breadth, 94; palatal length, 98; mastoid breadth, 62; length of crown of upper carnassial tooth, 19. An adult female from same place measures: basal length, 171; basilar length of Hensel, 167; zygomatic breadth, 94; palatal length, 90; mastoid breadth, 59; length of crown of upper carnassial tooth, 18.

Canis vigilis sp. nov.

Type locality.—Manzanillo, Colima, Mexico. Type No. $\frac{32627}{44550}$, ♀ young adult, U. S. National Museum, Department of Agriculture collection. Collected February 6, 1892, by E. W. Nelson. Original No. 1840.

Characters.—Similar to *C. peninsulæ*, but darker and more highly colored, with more black on forearm and no black on under side of tail except at tip; upper carnassial and first molar much smaller.

Color.—Muzzle dull cinnamon rufous; top of head grizzled buffy fulvous and black; ears fulvous, upper parts buffy-ochraceous, profusely mixed with black (under fur fulvous); under parts strongly suffused with pale fulvous; throat collar with black tips strongly marked; fore and hind legs fulvous, as in *ochropus*, but deeper, especially on fore feet; black on upper side of forearm more extensive; outer side of thigh and leg strongly intermixed with black-tipped hairs, which reach down to or below knee; under side of tail dull pale fulvous, whitish basally, and tipped with black (hairs of under side anterior to black tip *not* tipped with black).

Cranial and dental characters.—The skull of the type specimen of *Canis vigilis*, a young adult female, agrees in general characters with an adult female *peninsulæ* from Cape St. Lucas, but is somewhat larger, with slightly broader rostrum and longer and more slender mandible. The upper carnassial and molar teeth, however, are very much smaller and show that the two animals belong to different sections of the group. Compared with *Canis mearnsi*, its nearest neighbor on the north, *C. vigilis* has a larger skull and very much smaller teeth, particularly the upper carnassial and first molar. The first upper molar is decidedly smaller than in any known form except *C. microdon*, from which it differs in being deeply notched posteriorly.

Measurements.—Type specimen, ♀ young adult: total length, 1155; tail vertebræ, 335; hind foot, 190.

Cranial measurements.—Type specimen: basal length, 166; basilar length of Hensel, 163; zygomatic breadth, 87; palatal length, 85; mastoid breadth, 59; length of crown of upper carnassial tooth, 17.5.

VOL. XI, PP. 35-37 MARCH 13, 1897

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

COLLOMIA MAZAMA, A NEW PLANT FROM THE VICINITY OF CRATER LAKE, OREGON.

BY FREDERICK V. COVILLE.

In August, 1896, while engaged with Mr. John B. Leiberg in an examination of the flora of Crater Lake and vicinity, in the state of Oregon, a violet-flowered Collomia was discovered. It was at once recognized as a probably new species, and a description was drawn in the field from the fresh specimens. In the transmission of our season's collection to the National Herbarium at Washington, however, the specimens of this plant, with several other species from the same vicinity, were lost, and even after a most careful search could not be traced. Fortunately a single complete set of the numbers collected had been withheld from the main shipment and stored at a remote and, for a portion of the winter, snowbound point in Idaho. The two sheets of specimens in this set finally reached Washington late in February and now make possible the publication of the species.

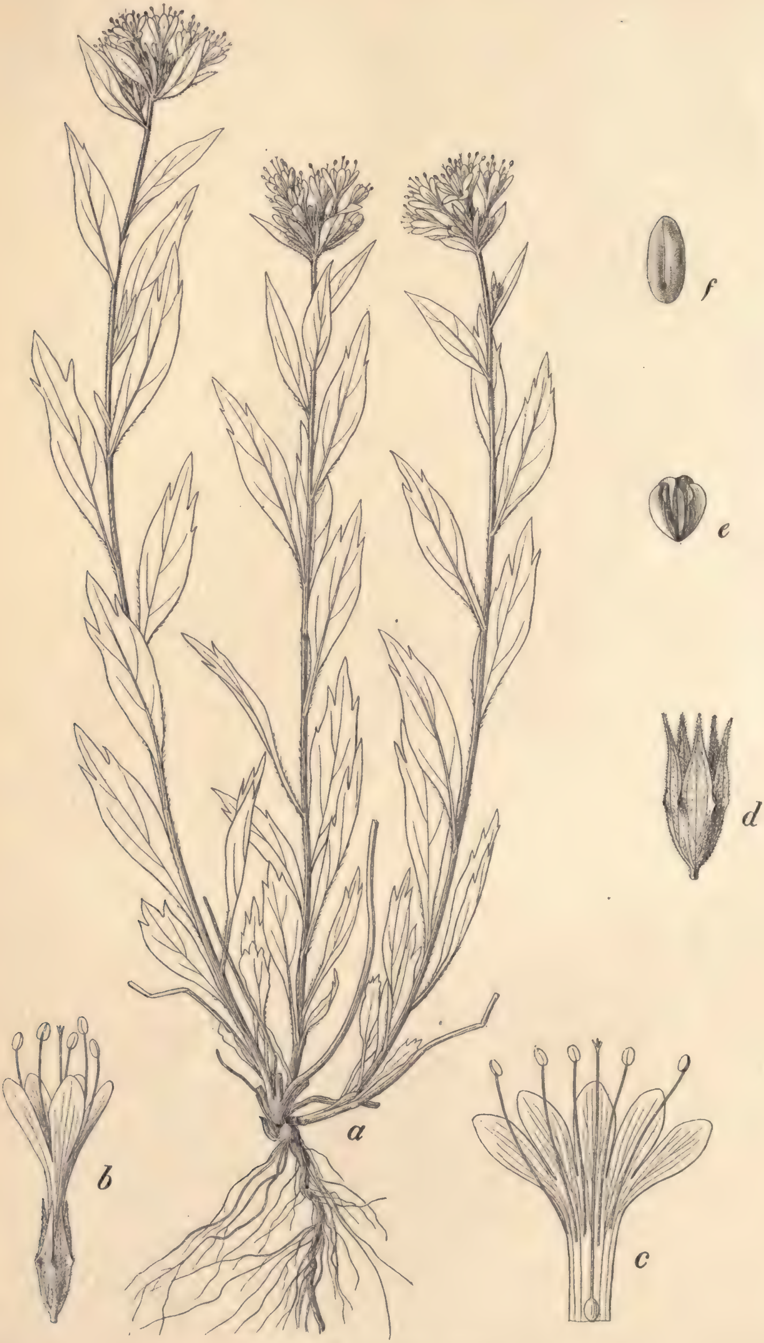
Collomia mazama sp. nov.

Plant perennial, few to many-stemmed from a slender tap-root, 15 to 30 centimeters high, below the inflorescence glabrous or with a few arachnoid viscid hairs on the stem and leaf-margins; stems terete, commonly 1 to 2 millimeters in diameter, simple up to the inflorescence; leaves oblong-lanceolate to lanceolate, commonly 3 to 6 centimeters in length, acute at apex and base, acutely and somewhat laciniately 3 to 5-toothed above, the uppermost entire and sessile, the lower often oblanceolate and tapering into a short narrowly margined petiole; inflorescence subcapitately cymose, sometimes with additional short-pedunculate clusters of flowers from one or two of the upper axils, glandular-hairy and strong-scented; bracts similar to the uppermost leaves, entire, the lower usually 2 to 3 centimeters long and slightly exceeding the flower-cluster; calyx commonly 7 to 9 millimeters long, with the plicate sinuses characteristic of the genus, the lobes equaling the tube, triangular-lanceolate, acuminate, in fruit reaching a length of 5 or 6 millimeters; corolla about 15 millimeters long, deep blue to violet-purple, above the calyx expanding into a funnel-shaped throat, the narrowly oblong-obovate obtuse moderately divergent lobes about 5 millimeters in length; stamens slightly exserted, the anthers white, the filaments of somewhat unequal length, but inserted almost equally about half way from the sinuses to the base of the tube; ovule single in each cell of the ovary; style also exserted, the stigma 3-lobed; capsule about half as long as the fruiting calyx, narrowly obovate, truncate or depressed at the three-lobed summit, loculicidal in dehiscence, the 3 valves partially breaking away from the axis; seed about 3 millimeters long, olive-brown at maturity, linear-oblong, obtuse at both ends, sulcate on the axial face and attached to the placenta for almost its whole length, dull but without distinct markings, developing the characteristic spiracles of Collomia in water.

Type specimen in the United States National Herbarium, collected August 15, 1896, near Crater Lake, in the Cascade Mountains of Oregon, at an altitude of 1,900 meters, by Frederick V. Coville and John B. Leiberg, No. 429.

This showy and beautiful Collomia is remarkable for its perennial habit and the deep violet-blue color of its flowers. The glandular hairs of the calyx and peduncles give off the odor characteristic of most of the Collomias and some of the Phacelias. The only other blue-flowered, perennial species of the genus is *Collomia debilis* (Wats.) Greene, a variable plant, first collected in southern Utah, later in western Montana, the Cascade Mountains, and the northern Sierra Nevada, one or more of its various forms probably susceptible of varietal or specific separation.

The plant grows in abundance in slightly moist, open, sparingly grassy places in the forest, in the vicinity of streams and wet meadows, about five kilometers west of the upper camping ground at Crater Lake, and continues southeastward at about the same altitude, at least as far as the lower camping ground, about two and a half kilometers south of the rim of the lake. For one starting from the junction of the Rogue River and Fort Klamath roads and traveling northward toward Crater Lake, the most convenient and probably the first place for finding the plant is on the flat ground where the road first crosses the stream on which the lower camping ground is situated. Specimens were seen here, but not in abundance. At the time of collecting, the species was in full flower, and very few of the specimens had produced mature seeds.



COLLOMIA MAZAMA Coville

Mazama was the aboriginal designation of the Rocky Mountain goat, and was proposed also by Rafinesque as a generic name for the same animal. The name is now well known through the organization of mountain-climbers called the Mazamas, who, on August 21, 1896, with appropriate ceremonies, bestowed the name Mount Mazama upon the mountain within whose walls Crater Lake is enclosed. To this mountain and to the members of the organization itself this plant is now dedicated.

EXPLANATION OF PLATE I.

Fig. *a*, *Collomia mazama*, flowering plant; *b*, flower; *c*, corolla, split down one side, showing the stamens and pistil within; *d*, fruiting calyx; *e*, capsule, after dehiscence, showing the valves and central axis; *f*, seed, viewed from the inner face. Figure *a* is two-thirds natural size, figures *b* to *e* enlarged two diameters, and figure *f* four diameters.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

DELPHINIUM VIRIDESCENS AND *SAMBUCUS LEIOSPERMA*, TWO NEW PLANTS FROM THE NORTHWEST COAST.

BY JOHN B. LEIBERG.

In the collections of plants recently made by the United States Department of Agriculture in Oregon and Washington occur a red-berried elder which apparently should be separated from the other known species, and a remarkable larkspur with greenish-purple flowers, differing conspicuously in this respect from any other American member of the genus. Descriptions of these two plants are given herewith.

Delphinium viridescens sp. nov.

Stem 1 to 1.5 meters high from fascicled subfusiform roots, smooth below or sometimes minutely puberulent, the upper portion and the inflorescence densely pubescent with spreading yellow hairs from glandular flask-shaped bases; basal and cauline leaves glabrous, thin in texture, semicircular in outline, 8 to 10 centimeters broad, on petioles 12 to 16 centimeters long, deeply 5-parted, the divisions 3 to 5-lobed or cleft; upper cauline leaves pubescent, pinnately 3-parted, the divisions 3 to 7-cleft or broadly lobed, often stalked, diminishing upwards and becoming linear; inflorescence a strict narrow raceme about 30 centimeters long, in very robust plants reaching a length of 1 meter; flowers secund or sometimes subdistichous in the raceme, small for the size of the plant, on pedicels about 10 millimeters in length; lower sepals ovate-acuminate, about 8 millimeters long and 5 millimeters wide, pilose when young, becoming nearly glabrous in age, brown tinged with dull purple; spur straight, about 1 centimeter long; laminæ of lateral petals deeply cleft, densely pilose, about 5 millimeters long and 4 millimeters wide, dull purple in color, the claws narrow and about 6 millimeters in length; upper petals about 1.7 centimeters long, including the short spurs, bidentate at the apex; follicles about 7 millimeters long and 2.5 millimeters wide, erect, pubescent; seeds nearly cubical, about 2 millimeters long and of nearly the same width, narrowly scarious-winged at the angles.

Collected near Peshastin, Okanogan County, Washington; altitude, 500 meters; No. 563, Sandberg and Leiberg, 1893. Type specimen in the United States National Herbarium.

A well-marked species and in aspect very different from all our northwestern forms. By its technical characters it occupies an intermediate position between *D. hesperium* and *D. distichum.* From the former it differs in its fusiform roots and much larger, thinner, glabrous, less divided basal leaves; from the latter species it is separated by its conspicuously yellow-pilose inflorescence, its less dissected cauline leaves, shorter follicles, and more open raceme. By the small, inconspicuous brownish or greenish-purple flowers the plant may be separated at a glance from any of the described North American species of Delphinium.

The plant is common in the wet meadows along the Wenatchee River, in the State of Washington. It is commonly a very robust species, sometimes reaching a height of 2 meters, the basal leaves often 20 centimeters broad.

Sambucus leiosperma sp. nov.

Shrubby, 1.3 to 2 meters in height, forming with its spreading stems loose open clumps; pith of two-year-old shoots yellowish-brown; leaflets 5 to 7, varying from oblong to lanceolate, 4.5 to 8 centimeters in length, 1.5 to 3 centimeters in width, acute or acuminate, subsessile or short-petioled, sharply serrate, the apices of the teeth usually inflexed, smooth, or with a scattered short pubescence, especially on the petioles and the lower surface of the leaves along the midrib; stipules present on the flowering shoots, subulate, about 1 centimeter long and 0.5 millimeter wide; cyme oblong, somewhat flattened when in fruit, scabrous-puberulent, the branches membranaceously margined at the forks; flowers yellowish-white, drying the same color; berry scarlet, containing 3 to 5 seed-like nutlets, these very smooth, 2 to 3 millimeters long and about 1.5 millimeters wide.

Collected at Crater Lake, Oregon; altitude 2230 meters, No. 370, Coville and Leiberg, 1896. Type specimen in the United States National Herbarium.

This is the red-fruited elder of the higher Cascades of Oregon and Washington. It extends northward also into Alaska, as indicated by specimens in the National Herbarium, collected on Kadiak Island, in 1888, by Mr. C. H. Townsend, naturalist of the

'Albatross.' *S. pubens* Michx., *S. melanocarpa* Gray, and *S. leiosperma* form a group wherein the specific distinctions lie almost wholly in the color of the mature fruit and the character of the surface of the nutlet. To these three species should be added a fourth, the *S. callicarpa* of Greene (as restricted). The character of the hard covering of the nutlets in the latter species is still a matter of uncertainty, as the descriptions contain no reference to this point. Assuming, however, that certain specimens of red-fruited elder in the National Herbarium collected in central and southern California correctly represent that species, we can arrange the group as follows:

Mature fruit scarlet.
    Surface of nutlets transversely rugose .... *S. pubens.*
    Surface of nutlets puncticulate .... *S. callicarpa.*
    Surface of nutlets smooth .... *S. leiosperma.*

Mature fruit black.
    Surface of nutlets transversely rugose .... *S. melanocarpa.*

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

DESCRIPTIONS OF TWO NEW MURINE OPOSSUMS FROM MEXICO.

BY C. HART MERRIAM.

Two very different types of pigmy opossums are known from Mexico—the 'red' or rufous *Marmosa murina* (Linn.) and the pale ashy gray *M. canescens* (Allen). Mr. Nelson obtained representatives of *M. murina* at Chicharras and Huehuetan, *Chiapas*, and Juquila, *Oaxaca*, and of *M. canescens* at Santo Domingo de Guzman, Isthmus of Tehuantepec (the type locality); Puerto Angel, Tlapancingo, and Oaxaca, *Oaxaca;* Amolac, *Puebla;* Tlapa, Lochi, and Acapulco, *Guerrero*, and Hacienda Magdalena, *Colima.*

The specimens of the *M. murina* type are paler rufous than the typical form and have the middle of the face abruptly lighter, so that it is necessary to recognize them as a geographic race or subspecies. The Oaxaca specimens of the *canescens* type are markedly darker than typical *canescens* and differ in other respects. The form is here described as distinct under the name *M. oaxacæ.*

Marmosa oaxacæ sp. nov.

Type from City of Oaxaca, Oaxaca, Mexico. No. 68240, ♀ adult, U. S. National Museum, Biological Survey collection. Collected August 14, 1894, by E. W. Nelson and E. A. Goldman. Original No. 6571.

Geographic distribution.—Sonoran fauna of highlands of Oaxaca; limits of range unknown.

General characters.—Size small, smaller than a half-grown rat; similar to *M. canescens* (Allen), but very much darker, and with the dark of upper parts reaching wrists and ankles; feet and ears smaller.

Color.—Upper parts from just behind eyes to base of tail dark sepia brown (almost dusky in fresh pelage); under parts buffy yellow, much deeper than in *canescens;* median face patch (from nose to behind eyes) pale buffy brown; orbital rings large and black, connected posteriorly by dark top of head; dark color of upper parts reaching wrists and ankles; tail bicolor, dark above, whitish beneath.

Cranial characters.—Skull and teeth similar to those of *D. canescens*, but frontal plate a little broader. Measurements of skull of type specimen: basal length, 29; zygomatic breadth, 18.5; palatal length, 17; interorbital breadth, 4.8; greatest breadth of frontals, 8.

Remarks.—Marmosa oaxacæ is an upland or Sonoran representative of the tropical *M. canescens* of J. A. Allen. The type of *canescens* came from Santo Domingo de Guzman, on the Isthmus of Tehuantepec. Specimens collected by Mr. Nelson extend its range northwesterly over the arid tropical hills and lowlands of the States of Oaxaca, Guerrero, and Michoacan to the Hacienda Magdalena, in Colima. A specimen was obtained as far inland as Amolac, Puebla.

Marmosa oaxacæ, on the other hand, inhabits the Sonoran highlands of Oaxaca, at the extreme southern end of the tableland of Mexico—a very different fauna. The two forms may be found to intergrade where the Sonoran fauna passes into the tropical, but no evidences of intergradation are to be seen in the eleven specimens of *canescens* obtained by Nelson and Goldman. The new species rests on two specimens—the type, an old female, and an immature male—both from Oaxaca

Measurements (of type specimen in flesh).—Total length, 263; tail, 144; hind foot, 18.

Marmosa murina mexicana subsp. nov.

Type from Juquila, Oaxaca. No. 71526, ♂ im., U. S. National Museum, Biological Survey collection. Collected February 28, 1895, by E. W. Nelson and E. A. Goldman. Original No. 7571.

Geographic distribution.—Southern Mexico, in States of Oaxaca and Chiapas.

General characters.—Similar to *M. murina*, but rufous of upper parts decidedly paler, and middle of face from between eyes to nose abruptly buffy [in true *murina* the rufous reaches forward to nose]; ears smaller.

Color.—Upper parts from between eyes posteriorly to base of tail cinnamon rufous, gradually fading on sides to ochraceous buffy on belly; orbital ring black and reaching anteriorly to whiskers; middle of face from end of nose to between centers of eyes buffy, in marked contrast to rufous of top of head.

Cranial characters.—Skull similar to that of *M. murina*, but interparietal broader and shorter.

Measurements.—Type specimen (not full grown): total length, 274; tail, 162; hind foot, 20. An adult male from Chicharras, Chiapas: total length, 330; tail, 186; hind foot, 24.

Vol. XI, p. 45 MARCH 16, 1897

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

PHENACOMYS PREBLEI, A NEW VOLE FROM THE MOUNTAINS OF COLORADO.

BY C. HART MERRIAM.

During the past few years the field parties of the Biological Survey have collected numerous specimens of *Phenacomys* in the mountains of Idaho, Montana, and Oregon. All of these specimens belong to the species described by me in 1891 under the name *P. orophilus* (N. Am. Fauna, No. 5, p. 66, August, 1891), the type of which came from the Salmon River Mountains, in Idaho.

In August, 1895, one of my assistants, Mr. Edward A. Preble, trapped a new species on the side of 'Twin' or 'Lilies' Peak, near Longs Peak, Colorado, at an altitude of about 2,700 meters (approximately 9,000 feet). "The locality was perfectly dry and had been covered by a forest, most of which had fallen." The species may be described as follows:

Phenacomys preblei sp. nov.

Type from Longs Peak, Colorado. No. 74513, ♂ adult, U. S. National Museum, Biological Survey collection. Collected August 12, 1895, by Edward A. Preble. Original No. 647.

General characters.—Size rather small; color very pale and decidedly ochraceous.

Color.—Upper parts clay color, suffused with ochraceous buff and heavily lined on the back with black-tipped hairs; feet soiled whitish; under parts white, with a yellowish tinge, the plumbeous under color showing through.

Cranial and dental characters.—Skull similar to that of *P. orophilus*, but somewhat smaller, with posterior ends of ascending branches of premaxillæ more broadly expanded; interorbital ridges more strongly developed; jugal decidedly narrower and hardly, if at all, mortised into maxillary arm of zygoma; end of pterygoids swollen where they articulate with audital bullæ.

Measurements (type specimen).—Total length, 130; tail vertebræ, 30; hind foot, 17.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

NOTES ON THE LYNXES OF EASTERN NORTH AMERICA, WITH DESCRIPTIONS OF TWO NEW SPECIES.

BY OUTRAM BANGS.

The genus *Lynx*, constituting a well marked group of cats with many species in both North America and Eurasia, was divided by Gray, in 1867,* into two subgenera, *Lynx* and *Cervaria.* The division was made on wholly inadequate external characters, but the great differences, both cranial and external, which are now known to exist, fully warrant the recognition of Gray's two groups.

Mr. F. W. True, in 1887,† pointed out for the first time, I believe, the more important cranial characters that separate the members of the subgenera *Lynx* and *Cervaria.* Some European authorities, however, lump together as mere races the very different species of these two groups and will not even recognize the genus *Lynx* itself as more than subgenerically distinct from *Felis.* American mammalogists, on the other hand, agree in considering *Lynx* quite worthy of full generic distinction.

Genus LYNX Rafinesque.

Dental formula $i\,\frac{3-3}{3-3},\ c\,\frac{1-1}{1-1},\ pm\,\frac{2-2}{2-2},\ m\,\frac{1-1}{1-1}=28$. Legs and arms long and powerful; body short; whole build dog-like; tail very short; pelage full; a ruff of long hairs around throat; ear with decided pencil of long hairs; skull short and round; audital bullæ small, flat and broad; nasals, taken together, cone shaped (the nasals of *Felis*, taken together, are broadly truncate posteriorly); no distinct lobe on inner side of smaller upper premolar.

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* P. Z. S., 1867, p. 267. (The genus was called *Lynchus* by Gray.)

† Proc. U. S. Nat. Mus., 1887, p. 8.

Subgenus LYNX Rafinesque.

Feet and hands very large, the pads small; tail very short; pelage long and loose; ear with long pencil of hairs (even in the very young kittens); skull broad; rostrum wide; audital bullæ very small and flat; palatal exposure of presphenoid broadly flask shaped (Fig. 1); anterior condyloid foramen *not confluent* with foramen lacerum posterius; maxilla separated from nasals by the meeting (or nearly meeting) of the descending arm of frontal and ascending arm of premaxilla; canine teeth slender; lower molar tooth very large.

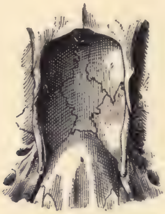

FIG. 1.—Postpalatal region of *Lynx*.

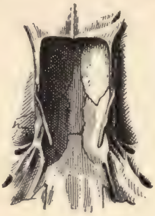

FIG. 2.—Postpalatal region of *Cervaria*.

Subgenus CERVARIA Gray.

Feet and hands small (in *floridanus*) to medium (in *ruffus*) the pads large; pelage full but close; tail medium (longer than in *Lynx*); ear with a short pencil of hairs; skull narrow; rostrum narrow and 'nipped in' from sides; audital bullæ deep and long; palatal exposure of presphenoid strap shaped or slightly triangular (Fig. 2); anterior condyloid foramen *confluent* with foramen lacerum posterius; maxilla touching nasals for some distance (much as in genus *Felis*); canine teeth strong; lower molar tooth small.

In North America the subgenus *Lynx* contains the northern species and the subgenus *Cervaria* the southern species. The same is probably true of the Eurasian members of the genus *Lynx*, although I have been unable to find a description of the skull of any of the more southern species. Mr. True examined some skulls of the Swedish *Lynx* and found that it belongs in the restricted subgenus *Lynx*.

The subgenus *Lynx* is represented in eastern North America by two forms:

1. *Lynx canadensis* (Geoff.) occupying the whole of Boreal North America from Maine and northern New York to Alaska, but now very rare and apparently becoming extirpated in the east.

2. *Lynx subsolanus* sp. nov., an island form, confined to Newfoundland.

The subgenus *Cervaria* is represented in eastern North America by three forms:

1. *Lynx ruffus ruffus* (Guldenstadt) ranging over the whole central region from about northern Georgia north to the coast of Maine.

2. *Lynx ruffus floridanus* (Raf.) occupying the whole of Florida, and extending west along the Gulf coast to Louisiana and north on the Atlantic coast certainly to southern Georgia. *L. floridanus* is so strongly marked a form that I think it will prove a distinct species when specimens are procured at points where it meets the range of *ruffus*. It is large, but lightly built, with very small feet and hands, and darker than *ruffus*, from which it differs in color pattern also, being much spotted and having black waved streaks on the back. The skull (pl. i, fig. 4) presents the extreme of slenderness and 'nipping in' of the rostrum.

3. *Lynx gigas* (sp. nov.) confined to the Province of Nova Scotia, where it is apparently insulated. It is a much larger and more powerful animal than *L. ruffus*, of a brighter and deeper color, with a larger skull, flatter audital bullæ and much heavier dentition.

DESCRIPTIONS OF NEW SPECIES.

Lynx subsolanus sp nov.

(Pl. II, Fig. 2.)

Type from Codroy, Newfoundland. ♂ old adult, No. 1190, collection of E. A. and O. Bangs. Collected by Ernest Doane June 13, 1894.

General characters.—Size and proportions as in *L. canadensis*, from which it differs in much darker and richer color.

Color.—Type (in summer pelage): Under fur on sides cinnamon rufous throughout, on back black basally and hazel terminally; long hairs (much longer than those of under fur) of three kinds: (1) wholly black; (2) wholly dull hazel, and (3) banded with hazel, yellowish gray, and black; predominating color of whole upper parts black and hazel irregularity varied; face dull yellowish gray, upper surface of ear black, with a large triangular spot of dark gray, pencil black; legs and arms dull yellowish hazel, faintly spotted with darker; tail very short, dull hazel above, dirty white below, black at tip; belly wood brown with irregular spots of black, the long hairs dirty white.

Kitten about one-third grown (No. 5754 from Bay St. George, Newfoundland). Whole upper parts (including legs and arms) yellowish cinnamon, somewhat spotted and 'lined' with blackish; ears with long pencil, as in the adult; tail cinnamon with black tip; under parts varying from soiled white to wood brown and faintly spotted with black.

Cranial characters.—The skull of *L. subsolanus* (pl. i, fig. 2) is similar in all its characters to that of *L. canadensis*.

Size of an old adult ♂ skull from Bay St. George, Newfoundland.* (No. 3798, collection of E. A. and O. Bangs): basilar length, 112.2; occipitonasal length, 125.4; last upper molar to foramen magnum, 70.6; zygomatic breadth, 95; mastoid breadth, 58.2; breadth across roots of canines, 37.6; greatest length of single half of mandible, 93.2.

Size.—Type (♂ old adult): total length, 919; tail vertebræ, 109; hind foot, 219; ear from notch, 80.

Lynx gigas sp. nov.

(Pl. II, Fig. 1.)

Type from fifteen miles back of Bear River, Nova Scotia. ♂ old adult, No. 4951, collection of E. A. and O. Bangs. Taken by a trapper December 11, 1895 (measured, skinned, and sexed by O. Bangs).

General characters.—Very stout and powerfully built; size very large; colors rich with much black on upper parts; triangular spot of gray on ear very small; skull large and strong; audital bullæ broader and flatter than in *L. ruffus;* dentition, especially canine teeth, very much heavier than in *L. ruffus.*

Type (in winter pelage): Under fur cinnamon rufous, paling off on sides and becoming more intense on back and on inner sides of flanks; long hairs, cinnamon and black, the black irregularly mixed in spots and streaks which are most conspicuous along middle of back; ears with short pencil of black hairs; upper surface of ear black, with small triangular spot of dark gray; tail above dull cinnamon, somewhat mixed with black, below white, tip black; under parts dull white, spotted with black, a pectoral collar of cinnamon; under surfaces of feet and hands black.

Cranial characters.—Skull (pl. i, fig. 1) very large and massive; audital bullæ broad and flat; basioccipital wide; distance across roots of canine teeth great; mandible very heavy.

Size of the type skull (♂ old adult): basilar length, 117.2; occipitonasal length, 132.2; last upper molar to foramen magnum, 72.6; zygomatic breadth, 98.4; mastoid breadth, 60; breadth across roots of canines, 39.2; greatest length of mandible, 92.

A skull of *Lynx ruffus ruffus* from East Hartford, Connecticut † (♂ old adult), measures: basilar length, 111; occipitonasal length, 124.8; last upper molar to foramen magnum, 70.2; zygomatic breadth, 94; mastoid breadth, 55.8; breadth across roots of canines, 34.4; greatest length of single half of mandible, 86.2.

Size.—The type (♂ old adult): total length, 1001; tail vertebræ, 177; hind foot, 200.

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* The skull of the type is somewhat injured by a rifle bullet which passed through it lengthwise.

† No. 1405, collection of Charles F. Batchelder, Cambridge, Mass.

VOL. XI, PP. 53-55 MARCH 16, 1897

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

DESCRIPTION OF A NEW RED FOX FROM NOVA SCOTIA.

BY OUTRAM BANGS.

For some years I have known of the existence in Nova Scotia * of a large red fox, much larger and of a deeper color than the small yellowish red *Vulpes pennsylvanica typica* (Bodd.) of the Central States. I have had some difficulty in getting specimens of this fox, but now have a series of five skins and six skulls from Digby, Bear River, and Annapolis, Nova Scotia. Unfortunately my specimens are mostly females or young. I have no skin and only one skull of a very old male. The old males are often of great size. My friend, H. A. P. Smith, Esq., of Digby, who has killed very many, has several times taken them weighing close to twenty pounds.

The Nova Scotia fox presents all the color phases known as 'cur,' 'cross,' 'silver gray,' and 'black' foxes. One of my specimens is a fine 'cross.' The new fox in its normal red pelage is a very beautiful animal, and the fur is well known to dealers, who pay much higher prices for it than for the fur of the southern red fox.

The new form may be known as:

Vulpes pennsylvanica vafra subsp. nov.

Type from Digby, Nova Scotia, No. 116, female, old adult. Collection of E. A. and O. Bangs. Collected November 3, 1893, by O. Bangs.

General characters.—Size considerably larger than *Vulpes pennsylvanica*

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*This large form probably ranges throughout Boreal Eastern North America generally.

typica. General color of upper parts bright ferruginous instead of tawny ochraceous, as in *V. pennsylvanica typica.*

Color (the type in normal red phase).—Whole upper parts deep, bright ferruginous, somewhat mixed with yellow-tipped hairs on face and rump, this color extending around sides and almost meeting on belly; abdomen, inner sides of flanks, and upper lip white; throat, chin, and central line along belly grayish white; tail ferruginous with a conspicuous white pencil, many of the hairs black tipped; upper surface of ears black, edged all round with yellowish ferruginous and dirty white inside; hand and forearm black, gradually shading into ferruginous at elbow; foot black, slightly mixed with ferruginous, the black extending up flank in a narrow line.

Cranial characters.—Skull larger than that of *V. pennsylvanica typica* from the Central and New England States; rostrum broader; distance across roots of canines much greater; dentition much heavier.

Size of an old adult ♀ skull (the type): basilar length (basion to front of premaxillary), 133; occipitonasal length, 133.2; zygomatic breadth, 75.8; mastoid breadth, 46; greatest breadth of rostrum, 24; greatest length of single half of mandible, 106.8. Size of an old adult ♂ skull (No. 2001, Bangs collection, topotype): basilar length, 134.2; occipitonasal length, 135.2: zygomatic breadth, 79.4; mastoid breadth, 47; greatest breadth of rostrum, 25.8; greatest length of single half of mandible, 110.4. Two skulls of *V. pennsylvanica typica* of exactly corresponding ages measure as follows: ♀ old adult, from Hampton, Connecticut, No. 4286, Bangs collection: basilar length, 120; occipitonasal length, 122.6; zygomatic breadth, 71.6; mastoid breadth, 44; greatest breadth of rostrum, 21; greatest length of single half of mandible, 96.8. ♂ old adult, from Waltham, Massachusetts, No. 115, Bangs collection: basilar length, 123.4; occipitonasal length, 123.6; zygomatic breadth, 71.8; mastoid breadth, 44; greatest breadth of rostrum, 21.8; greatest length of single half of mandible (estimated, tip imperfect), 100.

Size.—Female, old adult (the type): total length, 1077; tail vertebræ, 401; hind foot, 166. Mail, young adult, from Annapolis, Nova Scotia (No. 1991, Bangs collection): total length, 1087; tail vertebræ, 403; hind foot, 173. Two specimens of *V. pennsylvanica typica* of corresponding ages (♀ old adult from Hampton, Connecticut, No. 4286, Bangs collection, and ♂ young adult from Pittsfield, New Hampshire, No. 650, Bangs collection) measure respectively: total length, 945; tail vertebræ, 340; hind foot, 143; and total length, 1028; tail vertebræ, 375; hind foot, 157.

Remarks.—As some European writers still persist in considering the American red fox a mere variety of the old world *Vulpes vulpes*, it may be well to point out a few of the characters by which these wholly distinct animals can always be distinguished.

The European red fox (*V. vulpes*) has more white on the upper lip and less black on the legs and arms than the American (*V. pennsylvanica*). The skulls of the two can always be told apart. *V. vulpes* has a heavy, massive skull, with deep interorbital constriction, narrow frontals, and a very wide palate. *V. pennsylvanica* has a much lighter skull, which is broader between the orbits and narrower across the palate. There is also a very striking difference in the upper outline of the skulls when viewed in profile. This line is nearly straight in *Vulpes vulpes*, while in *V. pennsylvanica* it dips decidedly in front of the root of the zygoma and rises between the orbits.

I can find no name based on the large northern red fox.

Desmarest, in 1820, called the 'cross fox' *Canis decussatus*, and refers to Geoffroy Collection du Museum.* It is given as an inhabitant of "L'Amérique Septentrionale." As all three races of our red fox occasionally show this color phase, the name cannot be said to apply to one more than another.

Desmarest's *C. argentatus* is said to inhabit America and Asia. *Canis argentatus* 'The silver fox' dates (so far as I can ascertain) from Shaw's General Zoölogy, 1800–1826, and is based on Pennant, who says it inhabits the forests of Louisiana (in his day the whole lower Mississippi Valley). This name must therefore have been given to the 'silver gray' phase of the Southern red fox *V. pennsylvanica typica.*

Richardson in Fauna Boreali-Americana, 1829, gives three 'red foxes':

Canis (*Vulpes*) *fulvus* (Desmarest).†

Canis fulvus var. *β decussatus* (Geoffroy, Coll. du Mus.).

Canis fulvus var. *γ argentatus* (Desmarest).

Richardson's *Canis fulvus* is not *Vulpes pennsylvanica typica*, but the subspecies named *Vulpes macrourus* by Baird in 1852. Richardson assigns no different range to his var. *argentatus*, which must be assumed to be the 'silver gray' phase of the same form. He quotes a description of var. *decussatus* from Joseph Sabine's Appendix to Franklin's Journey, 1823, p. 656. All Sabine says as to locality, under the head of this variety, is "The specimen received from Capt. Franklin and that from the Hudson Bay Company nearly correspond." The animal described might have been an example of any form in the 'cross' phase and most probably was the prairie fox, *V. pennsylvanica macroura* (Baird).

While all our red foxes sometimes present the various different color phases, still 'cross' and 'silver gray' foxes are more common northward. This corresponds with the general tendency among our mammals which are subject to melanism. It is now known that black woodchucks and black gray squirrels are more often met with at the northern part of the range of these species, and the same will probably prove to be the case with many other species.

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* This reference I have been unable to verify, only one copy of the work being known to exist, and that in the Paris Museum. Under the head of *Canis decussatus* Geoff. in Nouveau Dictionnaire D'Histoire Naturelle, 1816, vol. 6, p. 518, appears the following, apparently written by Desmarest: "Cette espèce est du nord de l'ancien continent. Selon M. Cuvier elle ne differe point de celle du renard commun." From this I infer that Geoffroy gave the name *Canis decussatus* to the European 'Cross Fox.'

† *Canis fulvus* of Desmarest, 1820, is, of course, antedated by *Canis vulpes* var. *δ pennsylvanicus* Boddært, 1785, as shown by Gray (P. Z. S., 1868 p. 518).

VOL. XI, PP. 57-60 MARCH 23, 1897

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

THE ITINERARY OF JOHN JEFFREY, AN EARLY BOTANICAL EXPLORER OF WESTERN NORTH AMERICA.

BY FREDERICK V. COVILLE.

Among the botanical explorers who have done important work in North America, John Jeffrey is one of the most obscure. It has been known that he was a Scotchman, that about the year 1850 he was sent to our northwest coast by patrons of botanical science in Edinburgh, and that he made important collections; but it is not known* in what town or in what year he was born nor in what country or in what year he died. One very rare pamphlet, issued in the year 1853, which contains descriptions of *Pinus jeffreyi* and a few other new species, and has been seen by few American botanists, indicates that he had visited the coastal region of Oregon and the mountains of northern California. It has not been known that ten other pamphlets or circulars regarding his work are in existence, and that Jeffrey traveled from Hudson Bay to the Rocky Mountains of British America and the shores of the Pacific Ocean, and from the mouth of the Gila River, in Arizona, to the Fraser River, in British Columbia.

Through the kindness of Professor Isaac B. Balfour, of Edinburgh, and Professor C. S. Sargent, of the Arnold Arboretum, a mass of documents, both manuscript and printed, relative to Jeffrey and his work has been placed in my hands for examination, a courtesy which I have to acknowledge with grateful appreciation. From these papers the following sketch has been chiefly drawn:

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*According to Britten and Boulger, Biographical Index of British and Irish Botanists, 1893, p. 93.

On the 22d of November, 1849, was held at the Botanical Gardens in Edinburgh a meeting of "gentlemen interested in the promotion of the arboriculture and horticulture of Scotland." This meeting resulted in a decision to send to western North America a botanist, who should collect the seeds of trees, shrubs, and other plants suitable for horticultural purposes, in the region traversed by David Douglas, "to complete his researches, and to extend them into those parts of the country not fully explored by him." It was decided to raise the necessary funds through subscribers, who should share in the specimens received from the collector.

The subscribers formed themselves into an organization, under the chairmanship of Professor J. H. Balfour, designated in their official proceedings as the "Oregon Botanical Association." The work of their collector was called usually the "Botanical Expedition to Oregon," sometimes the "Oregon Botanical Expedition." Eleven quarto circulars of one to four pages each (in one case with five lithograph plates), issued to the members of the association by Andrew Murray, its secretary, have been examined by the writer—doubtless a complete set—and from the miscellaneous dates, numbers, and localities given in them the itinerary of the collector has been compiled.

November 20, 1850, Mr. Murray reported, on behalf of an executive committee, that the services of Mr. John Jeffrey had been secured, and that with authentic credentials and the hearty coöperation of the Hudson's Bay Company he had sailed from London early in June, 1850, for Hudson Bay.

On April 7, 1851, Jeffrey wrote Professor Balfour from Jasper House, in the British Rocky Mountains, on the headwaters of the Athabasca River, stating that he had left York Factory, on Hudson Bay, August 20, 1850, and reached Cumberland House, on the Saskatchewan River, October 8, where he remained till the early part of January, 1851. He had then proceeded up the Saskatchewan to Edmonton House, overland to the Athabasca, and up that river to Jasper House, where he arrived March 21. A small and unimportant collection from the eastern side of the Rockies was shipped about this time and reached Edinburgh late in the year.

From Jasper House Jeffrey crossed the Rocky Mountains at Athabasca Pass, between Mount Brown and Mount Hooker, and coming to the Columbia River at the point where it bends abruptly around the northern end of the Selkirk Mountains, descended it to Fort Colville, on the Columbia a few miles above the mouth of Colville River, in the present state of Washington. He arrived at this place about May 13, 1851.

On July 9 Jeffrey was at the junction of the Okanogan and Similkameen (spelled by him Semekemele) rivers, in Washington, just south of the present British boundary, having reached that point doubtless by descending the Columbia river from Fort Colville to the mouth of the Okanogan and following the latter to its forks. He then ascended the Similkameen and its branch, the Tulameen, stopping at Campment des Femmes, near the mouth of Otter River, a northern tributary of the Tulameen, and proceeded across the country westward to Fraser River. He appears to have descended immediately to Vancouver Island, for the circulars mention certain plants collected there in July, 1851, and then to have returned to the Fraser. He went up this river at least as far as 50° 23′ north latitude, collecting from August 11 to September 27 to an altitude of 6,000 and even 8,000 feet in the mountains east of the river. He made collections also in the autumn on Mount Baker, in extreme northwestern Washington, one entry being as late as October 2.

The winter of 1851–'52 and the following spring, until at least April 24, Jeffrey spent on Vancouver Island, probably at Victoria. In May, 1852, he was at Fort Nisqually, Washington, at the head of Puget Sound, and in the same month he went on southward to Fort Vancouver (site of the present town of Vancouver, Washington), on the Columbia River. Remaining here for about two months, he next engaged in an expedition, from about August 1 to November 1, to the valleys of Umpqua, Klamath, Trinity, and Rogue rivers, Siskiyou Mountains, Cascade Mountains, and Mount Shasta, all in southern Oregon and northern California. On December 4, 1852, he was on Mount Jefferson, in the Cascade Mountains of Oregon, about latitude 44°.

Jeffrey passed the winter of 1852–'53, like the preceding one, on the lower Columbia. In the following season, 1853, he repeated in part his work of the preceding year, collecting in the Umpqua Valley and the Siskiyou Mountains on Clear Creek, Mount Shasta, Applegate River, Scott Mountain, and the Coast Range, on the Sierra Nevada in latitude 38°, in the Sacramento Valley, and the American fork of the Sacramento, and at San Francisco Bay.

The plants of this season's collecting, 1853, from the localities mentioned above, were the last that Jeffrey sent to Edinburgh, and his employment by the association practically ceased at this time, his original contract being for three years' service. The following extract from a letter received by Andrew Murray in Edinburgh from his brother, W. Murray, who was living at San Francisco, gives a hint of Jeffrey's probable movements:

"SAN FRANCISCO, *19 May, 1854.*

"I yesterday received your letter enclosing one for Jeffrey. * * *

"I went again to McKinlay, Garrioch & Co., and they have deciphered his address to be Fort Yuma, on the Gila River (just where it joins the Colorado), where he says he will probably be until the 1st of August, and directs his letters to be forwarded by Adams & Co.'s Express to the care of their agent at San Diego, Mr. F. Ames.

"I accordingly put his letter in an envelope addressed in conformity with these instructions and took it to Adams & Co.'s Express. * * *

"They, McKinlay, Garrioch & Co., say he is a hard working, enthusiastic, very steady, and temperate man, and that just before starting for San Diego he was some three weeks arranging the proceeds of his excursions, and they doubt not that he despatched them. He had been for some weeks sick before that, which accounts for part of the long stay in San Francisco. * * *

"I met the consul just now and he said he had received another letter for Jeffrey. I forwarded it along with yours. The consul says that he (Jeffrey) never called at the consulate; that there had been quite a budget of letters and other things there for him, which have since been forwarded to him by McKinlay, Garrioch & Co. at the same time as your previous letter. * * *

"You will possibly think that I ought to have been able to find out Jeffrey while he was here, but at that time I neither knew that McKinlay, Garrioch & Co. were acquainted with him, nor that Allan, Lowe & Co. were connected with the Hudson's Bay Co."

Mr. John Ballender, who knew Jeffrey at Fort Vancouver in 1852 and 1853, writing to Andrew Murray under date of February 1, 1854, gives a brief outline of Jeffrey's movements in those years, and says:

"If this can be in any way of service to you I shall be most happy, as I feel very anxious respecting the fate of poor Jeffrey, knowing well that if he followed up the route hinted to me he had some dangers of no very trifling nature to contend with."

No further information about Jeffrey appears to have reached Edinburgh, but to those who know the terrible chances taken by a man attempting a trip to Yuma in the fifties, alone, there is little doubt that he perished of thirst upon the Colorado Desert.

VOL. XI, PP. 61-65 APRIL 21, 1897

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

THE TECHNICAL NAME OF THE CAMAS PLANT.

BY FREDERICK V. COVILLE.

One of the principal native food plants of several Indian tribes on our Northwest coast and in the northern Rocky Mountains is the camas plant, a member of the family Liliaceae, bearing a raceme of blue flowers and having a starchy edible bulb. It commonly passes under the technical name *Camassia esculenta*, a name which, it now appears, cannot be maintained.

In the year 1813 Ker, in the Botanical Magazine, plate 1574, figured and described a *Scilla esculenta*, the plants on which it was based having been grown at Fraser's nursery, London, from stock imported into England by Thomas Nuttall. It is necessary at the outset to identify this plant of Ker's.

From the description and the plate, no one would question that the original *Scilla esculenta* is the plant commonly called *Camassia fraseri*, but the supplementary statement made by Ker on the strength of a communication from Pursh, that it serves "as a principal article of food" to "certain Indians in the neighborhood of the [upper] Missouri River" throws doubt on this identification, for this statement cannot apply to *Camassia fraseri*. A knowledge of the origin of the plant sent to England by Nuttall would settle the matter, for the ranges of *Camassia fraseri* and *C. esculenta* are separated by a wide stretch of territory, the arid Great Plains. Ker does not give the desired information, but fortunately Nuttall himself, in his Genera of North American Plants, published in 1818, says, page 219: "In the spring of the year 1810 I discovered this plant near the confluence of Huron river [in the State of Ohio] and Lake Erie. I have since found it abundantly in alluvial situations a few miles from St. Louis, Louisiana [that is, St. Louis, Missouri], and more recently very plentiful on the lowest banks of the Ohio." From this it is clear that Nuttall did not get his specimens on the upper Missouri in his journey of 1810 to a point near the Mandan Indian villages of North Dakota, and indeed the camas plant does not extend so far east. The possibility that Nuttall had sent to England living bulbs brought back from the Rocky Mountains by Lewis and Clark may be dismissed by the lack of any direct evidence to that effect, as well as by the facts that none of Lewis and Clark's plants are mentioned in Fraser's Catalogue, and that Pursh, who went over their specimens and from them described the camas plant, had not living specimens but only dried ones. The plants which Nuttall sent to Fraser probably came from the St. Louis, as opposed to either the Lake Erie or the lower Ohio localities, for Fraser's Catalogue contains several other plants labeled as coming from the vicinity of St. Louis; none from the other two places.

This identification of Ker's *Scilla esculenta* as the equivalent of *Camassia fraseri*, the plant of the upper Mississippi Valley region, not only is satisfactory on geographic and descriptive grounds, but it agrees with the identifications of Torrey * and Watson,† and with the doubts expressed by Ker,‡ Hooker,§ and Lindley || as to its identity with the northwestern plant. The name *Scilla esculenta* being, therefore, not available for the camas plant, the name given it by Pursh in 1814, *Phalangium quamash*, is the oldest.

In the matter of generic names these plants have been well supplied. Scilla is now considered a distinct genus, and Phalangium is a synonym of Anthericum. Various authors recognizing the camas plant as not congeneric with either of these have given it a new genus name, such as Sitocodium Salisb., Lemotris Raf., Bulbedulis Raf., and Camassia Lindl., but Dr. Britton has recently brought to light a name older than any of these, namely, Quamasia. This was published by Rafinesque in 1818 in the American Monthly Magazine, second volume, page

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* Pac. R. Rep. **4**: 147. 1857.

† Proc. Am. Acad. **14**: 241. 1879.

‡ Bot. Mag. **38**: *t. 1574.* 1813.

§ Bot. Mag. **54**: *t. 2774.* 1827.

|| Bot. Reg. **18**: *t. 1486.* 1832.

265. In this publication, which was a review of Pursh's Flora, Rafinesque renamed Pursh's *Phalangium quamash* as *Quamasia esculenta*, thus giving to the camas plant its first name as a distinct genus.

The generic name Cyanotris of Rafinesque has given botanists some trouble from its citation as an equivalent of Camassia. It appears that Rafinesque twice published this generic name, apparently using it each time in a different sense. His first publication of it was in 1818 (not 1811 as cited in the Index Kewensis), on page 356 of the third volume of the American Monthly Magazine, where he described under the name *Cyanotris scilloides* a plant which has been referred sometimes to the northwestern. sometimes to the eastern Camassia. On geographic grounds, however, it cannot be the northwestern plant, and if it is the eastern plant Rafinesque's brief description is not altogether correct, for the leaves are not oblong-lanceolate nor is the capsule trispermous. In the following year, on page 192 of the fourth volume of the same journal, Rafinesque again published the name Cyanotris, this time basing it upon Michaux's *Helonias angustifolia*, a plant which is referred by recent authors to Zygadenus.

The citation and synonymy of the genus Quamasia are as follows:

Quamasia Raf.

Quamasia Raf., Am. Month. Mag. **2**: 265. February, 1818.

Cyanotris Raf., Am. Month. Mag. **3**: 356. September, 1818. Not Cyanotris Raf. 1819.

Lemotris Raf., Fl. Tellur. **2**: 26. 1836.

Bulbedulis Raf., Fl. Tellur. **2**: 26. 1836.

Camassia Lindl., Bot. Reg. **18**: *t. 1486.* 1832.

Sitocodium Salisb., Gen. Pl. Fragm. 27. 1866.

A rough synopsis of the species, with the principal bibliographical references, may be useful to students who desire to make a critical study of the group.

* *Perianth more than 18 millimeters in length.*

† *Perianth nearly regular, its parts commonly connivent above the ovary when withering, 5 to 9-nerved, usually 7-nerved.*

Quamasia leichtlinii (Baker).

Chlorogalum leichtlinii Baker, Gard. Chron. new ser. **1**: 689. 1874.

Camassia esculenta leichtlinii Baker, Bot. Mag. **103**: *t. 6287*. 1877.

Camassia leichtlinii Wats. Proc. Am. Acad. **20**: 376. 1885.

A species with flowers from dark blue to white, the bulbs eaten by the aborigines. It apparently ranges from the Cascade Mountains of Washington and Oregon westward to the Pacific, northward to Vancouver Island, and southward along the coast to the vicinity of San Francisco. It was described from white-flowered specimens cultivated in Europe from material collected in British Columbia by John Jeffrey in 1851.

†† *Perianth clearly irregular, five of its parts ascending, the other deflexed, all of them 3 to 5-nerved, usually 3-nerved, seldom connivent above the ovary when withering.*

‡ *Stems few to several in a cluster, commonly 60 to 80 centimeters high ; leaves usually 2 to 3.5 centimeters broad ; capsules obtuse at the apex, much exceeded by their pedicels.*

Quamasia cusickii (Wats.).

Camassia cusickii Wats. Proc. Am. Acad. **22** : 479. 1887.

The largest species of the genus, its flowers pale blue. The species is known only from the original locality, "slopes of the Eagle Creek [also known as Wallowa and Powder River] Mountains, [north] eastern Oregon, at 4,000 to 6,000 feet altitude," where it grows "on hillsides instead of in wet meadows," while its bulb is "nauseous, pungent, and inedible."

‡ ‡ *Stems commonly single, usually 30 to 50 centimeters high ; leaves seldom exceeding 2 centimeters in width ; capsules broadly acute at the apex, equaling or exceeding their pedicels.*

Quamasia quamash (Pursh).

Phalangium quamash Pursh, Fl. Am. Sept. **1**: 226. 1814.
Quamasia esculenta Raf. Am. Month. Mag. **2**: 265. 1818.
Anthericum esculentum Spreng. Syst. Veg. **2** : 84. 1825.
Camassia esculenta Lindl. Bot. Reg. **18** : *t. 1486*. 1832.
Camassia quamash Greene, Man. Bay Reg. Bot. 313. 1894.

Flowers usually dark blue, varying occasionally to white. This is the original camas plant of Lewis and Clark, who brought from the headwaters of the Missouri, in western Montana, the specimens on which Pursh's description was based. It extends westward at least to the Cascade Mountains of Washington and Oregon, and the Sierra Nevada of northern California, reaching southward into northern Nevada and Utah. It grows typically in so-called camas meadows, where the basaltic soil is very soft and wet in spring, but exceedingly hard and dry later in the season. The bulbs are still an important food among the Indians in many localities.

** *Perianth less than 18 millimeters in length.*

† *Pedicels longer than the bracts ; anthers about 3 millimeters in length.*

Quamasia howellii (Wats.).

Camassia howellii Wats. Proc. Am. Acad. **25**: 135. 1890.

Perianth described as pale purple, the capsules, about 6 millimeters in length, borne on pedicels three to four times as long. The species is known only from Grant's Pass, in southwestern Oregon.

†† *Pedicels shorter than the bracts; anthers about 2 millimeters or less in length.*

Quamasia esculenta (Ker).

Phalangium esculentum Nutt. in Fraser's Cat. 1813. Nomen nudum.

Scilla esculenta Ker, Bot. Mag. **38**: *t. 1754.* 1813.

Phalangium esculentum Nutt.; Ker, Bot. Mag. **38**: *t. 1574.* 1813. As synonym.

? Cyanotris scilloides Raf. Am. Month. Mag. **3**: 356. 1818.

Lemotrys hyacinthina Raf. Fl. Tellur. **3**: 51. 1836.

Camassia fraseri Torr. Pac. R. Rep. **2** [pt. 4]: 176. 1855.

Scilla fraseri Gray, Man. ed. 2. 469. 1856.

Sitocodium esculentum Salisb. Gen. Pl. Fragm. 27. 1866.

Quamasia hyacinthina Britton in Britton & Brown, Ill. Fl. **1**: 423. *fig. 1018.* 1896.

Scilla angusta Engelm. & Gray, Bost. Journ. Nat. Hist. **5**: 237. 1845.

Camassia fraseri angusta Torr. & Gr. Pac. R. Rep. **2** [pt. 4]: 176. 1855.

A plant with pale blue flowers, popularly known as the "wild hyacinth." It ranges almost throughout the Mississippi Valley, from western Pennsylvania to Wisconsin, Kansas, and southwestward to central Texas.

The two synonyms last cited belong to a narrow-leaved small-flowered plant (leaves seldom exceeding 6 millimeters in width, and perianth about 6 millimeters in length, as opposed to 8 to 12 millimeters and 10 millimeters respectively in the typical plant), originally collected by Lindheimer at New Braunfels, in central Texas, and said to extend to Louisiana and Missouri. Though considered a variety of this species by most authors, it merits critical study in the field, as, if the difference in time of flowering cited by the describers prove constant, it is probably a distinct species.

VOL. XI, PP. 67-68 APRIL 21, 1897

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

DESCRIPTION OF A NEW VOLE FROM OREGON.

BY GERRIT S. MILLER, JR.

A small species of *Microtus* of the *nanus* group, represented by twelve specimens from the Willamette Valley, Oregon,* may be named and described as follows:

Microtus canicaudus sp. nov.

Type from McCoy, Oregon. Adult ♂, No. 75841, U. S. National Museum, Biological Survey collection. Collected December 1, 1895, by B. J. Bretherton. Original No. 2119.

General characters.—Size and proportions about as in *Microtus nanus* (Merriam), but color yellower and less grizzled, and tail usually nearly uniform grayish above and below; skull broader than in *M. nanus*, with rounder audital bullæ and differently shaped bony palate.

Color.—Head, back, and sides umber-brown thickly sprinkled with blackish hairs, the ground color darker on head and paler on sides, where it shades rather abruptly into color of belly; ventral surface grayish white, faintly marked with yellowish; fur everywhere deep plumbeous at base, this color showing through irregularly on belly and throat; tail whitish gray, slightly paler below and darker at tip.

The exact shade of brown varies, but it is always yellower than in *M. nanus*, and seldom shows any approach to the peculiar grizzled appearance characteristic of the latter. The tail occasionally has a tolerably well-defined dark dorsal stripe, but in the great majority of specimens (taken in March, April, October, November, and December) it is scarcely visible.

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*Two from Beaverton (Nos. 371 and 372, Miller collection), and ten from McCoy (Nos. 75834–75842 and 75844, U. S. National Museum, Biological Survey collection), the latter kindly placed at my disposal by Dr. C. Hart Merriam.

Skull.—Fully grown skulls vary from 22.6 to 24.6 mm. in basilar length and from 14.6 to 15.6 in zygomatic breadth; brain case broader and deeper than in *M. nanus;* audital bullæ flatter and rounder; bony palate with excessively shallow lateral pits.

Teeth.—The enamel pattern, like that of the other members of the *nanus* group, is that of the typical or tetramerodont species of the subgenus *Microtus.*

Measurements.—Type specimen: total length, 135; tail vertebræ, 33; hind foot, 20. Average of eight adult topotypes: total length, 141; tail vertebræ, 35.7; hind foot, 20. (All measurements from fresh specimens by collector.)

General remarks.—*Microtus nanus*, *M. canicaudus*, and *M. mogollonensis* form a group of closely related species which in size, general appearance, and cranial and dental characters differ noticeably from other American members of the genus, but strikingly resemble the European *Microtus arvalis.* So close is this resemblance that it is possible to select skulls of *M. mogollonensis* (the smallest member of the group) from San Francisco Mountain, Arizona, that are practically indistinguishable from skulls of *M. arvalis* taken in Slavonia. The only constant cranial characters to distinguish the skulls of these two species appear to be the slightly broader rostrum, more flaring zygomata, and wider, less squarely truncate interpterygoid fossa of *mogollonensis.* Externally the resemblance is no less close, for *M. arvalis* has the same short tail and small hind foot as the American species, while in color it differs only in a somewhat yellower cast.

The three American species are distinguished from each other by the following characters:

M. mogollonensis (Mearns).—Total length, 132.2; tail vertebræ, 28.3; hind foot, 18 (average of eight adults); general color grizzled yellowish brown; tail indistinctly bicolor; basilar length of skull about 21 millimeters; nasal branches of premaxillaries considerably extended back of nasals; audital bullæ roundish; bony palate with lateral pits very deep.

M. nanus (Merriam).—Total length, 140; tail vertebræ, 37.7; hind foot, 18.9 (average of nine adults); general color grizzled grayish brown; tail distinctly bicolor; basilar length of skull about 23 millimeters; nasal branches of premaxillaries slightly extended back of nasals; audital bullæ subfusiform; palate with lateral pits moderate.

M. canicaudus Miller.—Total length, 141; tail vertebræ, 35.7; hind foot, 20 (average of eight adults); general color uniform umber-brown; tail indistinctly bicolor; basilar length of skull about 23 millimeters; nasal branches of premaxillaries scarcely extended back of nasals; audital bullæ roundish; palate with lateral pits very shallow.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

A SPECIES OF SHEARWATER (*PUFFINUS ASSIMILIS* GOULD), NEW TO THE NORTH AMERICAN FAUNA.

BY JONATHAN DWIGHT, JR., M. D.

A specimen of a strange Shearwater was sent to me some time ago by Mr. R. J. Boutilier from Sable Island, Nova Scotia, where it struck the west end light-house on September 1, 1896. It was submitted to Mr. Robert Ridgway, Dr. J. A. Allen, and Mr. William Brewster for examination, all of whom, in the absence of any material for comparison, naturally hesitated to express positive opinions as to its identity. There can be little doubt, however, that it is referable to the Allied Shearwater (*Puffinus assimilis*), a species described by Gould,* from New South Wales, Australia, and found by later observers at several other points in the South Pacific Ocean. There are no specimens apparently in North American museums. It appears to be the smallest of the Shearwaters, in spite of certain discrepancies in the measurements of several writers. The dimensions as given originally by Gould differ considerably from those recently published by Salvin,† and those of my bird come nearly midway between the two, except that the bill of my bird is shorter than the bills described. Gould's statement that 2⅜ inches is the length of bill is surely a misprint. In color my specimen corresponds exactly with the descriptions of *P. assimilis*, especially the upper parts "slaty-black rather bluer than *P. obscurus*," which species, besides being larger, differs in having dusky under tail coverts. It corresponds, too, with Gould's colored plate (Birds of Australia, vol. VII, 1848, pl. 59). Salvin considers *P. auduboni* a synonym of *P. obscurus*, and *P. subalaris* also has dusky under tail coverts. Another small species has been described, *P. elegans*, but the feathers of the back of this bird are edged with white. These are the only species to which my specimen is very closely related. It shows evidences of moult, for many of the body feathers are just sprouting, and several of the rectrices are barely out of their sheaths. It may be described as follows:

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* Proc. Zoöl. Soc., 1837, p. 156.

† Cat. Birds, British Mus., vol. XXV, 1896, p. 384.

Puffinus assimilis.

Entire upper parts, including head, nape, back, wings, tail coverts, and tail, bluish slate black, the greater wing coverts obscurely tipped with white; entire lower parts, including under wing coverts, axillaries, and under tail coverts, pure white. The black and white blend along a fairly definite line, passing through the lores and eye and down the sides of the neck, losing itself beneath the folded wing. The coverts of the outer edge of the wing beneath and the outermost of the under tail coverts are faintly dusky. The primaries beneath are dingy white along the inner webs nearly to the apices. Bill, in dried specimen, slate black. Tarsi and feet brownish black, webs between the toes yellowish.

Length in inches, about 11; wing, 6.80; middle rectrix, 2.90; tarsus, 1.36; middle toe, 1.38; middle toe with claw, 1.64; bill, culmen, 0.97; gape, 1.35; from nostril, 0.70; depth at nostril, 0.17; width at nostril, 0.17; unguis, 0.47.

The capture of the Allied Shearwater at Sable Island simply extends the range of a pelagic species, one of a large family of ocean wanderers. It has strayed several times to the Madeira Islands, but its natural habitat is the South Pacific Ocean, in the vicinity of New Zealand and Australia. Its occurrence at Sable Island is of course purely accidental and constitutes the first and only record for North America.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

DESCRIPTIONS OF TWO NEW RED BACKED MICE (*EVOTOMYS*) FROM OREGON.

BY C. HART MERRIAM.

The field parties of the U. S. Biological Survey, while at work in the southern part of the Cascade Range in Oregon last summer, obtained two undescribed species of *Evotomys*. The first of these was found in the Hudsonian zone at Crater Lake, on top of Mt. Mazama; the other in the Transition zone of the Rogue River Valley at Prospect, at the west base of Mt. Mazama.

The Crater Lake animal, named *E. mazama* after the mountain on whose summit Crater Lake is situated, is an alpine species and seems to be very distinct from any heretofore described. It was also found by us on Mt. Hood. The affinities of the Rogue River animal seem to be in the direction of *E. californicus*.

The new species may be known from the following descriptions:

Evotomys mazama sp. nov.

Type from Crater Lake, south end of Cascade Range, Oregon. No. 79913, ♂ ad., U. S. Nat. Mus., Biological Survey collection. Altitude 7000 feet [2130 meters]. Collected August 15, 1896, by C. Hart Merriam and Vernon Bailey. Original No. 5765.

General characters.—Size rather large; tail long for an *Evotomys;* ears medium or rather short; coloration rather pale; dorsal area relatively pale and not well defined.

Color.—Sides of head and body, and head from nose to forehead, pale gray or grayish ash; dorsal area pale dull chestnut, varying to pale rusty; under parts buffy white, the plumbeous under fur showing through;

tail bicolor, with sharp line of demarkation; upper side dusky, under side white; fore and hind feet white.

Cranial characters.—Skull large, rostrum long, especially as seen from below; braincase large and strongly subquadrate, flattened above; zygomata strongly spreading, the anterior root standing out rather abruptly from rostrum; audital bullæ large and strongly inflated; incisive foramina very long; enamel loops of molar teeth not crowded; those of last upper molar more irregular than usual.

Remarks.—Contrasted with *Evotomys obscurus* from the west base of Mt. Mazama, *E. mazama* may be distinguished by its much paler coloration, longer tail, and by the dimness or absence of the dusky patch on the foreleg just above the ankle. The skull differs from that of *obscurus* in the much greater length of the rostrum and incisive foramina. The crowns of the molar teeth are longer, and the loops less crowded.

Measurements.—Type specimen, ♂ adult: total length, 160; tail vertebræ, 54; hind foot, 19. Average of four adult ♂ from type locality: total length, 157; tail vertebræ, 52; hind foot, 18.75.

Evotomys obscurus sp. nov.

Type from Prospect, Upper Rogue River Valley, Oregon (at west base of Mount Mazama, altitude about 2600 feet or 800 meters). Type No. 80413, ♂ ad., U. S. Nat. Mus., Biological Survey collection. Collected August 29, 1896, by Edward A. Preble. Original No. 1455.

General characters.—Size rather large, tail medium; coloration dark; dorsal area dull and ill defined.

Color.—Sides of head and body and head from nose to forehead dark gray or grayish bister; dorsal area very dull umber brown, passing gradually into color of sides; under parts buffy white, the plumbeous basal fur showing through; tail sharply bicolor, dusky above, whitish beneath; fore and hind feet soiled white; ankle and foreleg from elbow to wrist dusky.

Cranial characters.—Skull short, particularly the rostrum; braincase subquadrate and moderately flattened, but less flattened than in *E. mazama;* zygomata bowed well outward, the anterior base standing square out from rostrum; audital bullæ large; crowns of molar teeth short, the loops crowded; incisive foramina short.

Remarks.—*Evotomys obscurus* is very much darker than *E. mazama*, and has a decidedly shorter tail. In general form the skull resembles that of *E. mazama*, but it is slightly smaller, the rostrum and incisive foramina are decidedly shorter, and the braincase is less flattened. The crowns of the molar teeth are shorter, and the enamel loops much more crowded. Externally the animal resembles *Evotomys occidentalis* from the Puget Sound country. The skull, however, differs strikingly from that of *occidentalis*, the latter being narrow and smoothly rounded like a small *Peromyscus*. Probably *E. obscurus* is more nearly related to *E. californicus* of the northwest coast region of California than to any other species.

Measurements.—Type specimen: total length, 155; tail vertebræ, 47; hind foot, 17. Average of three specimens from type locality: total length, 148; tail vertebræ, 46; hind foot, 17.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

THE VOLES OF THE SUBGENUS *CHILOTUS*, WITH DESCRIPTIONS OF NEW SPECIES.

BY C. HART MERRIAM.

Heretofore only a single species of Baird's subgenus *Chilotus* has been recognized—the '*Arvicola oregoni*' of Bachman, which inhabits the coast region of Oregon.

While making a Biological survey of the Crater Lake region, in the southern part of the Cascade Range in Oregon, last August, Mr. Vernon Bailey and I secured a new member of the group. It is apparently an alpine species and differs strikingly from *M. oregoni* in much paler coloration and shorter tail. A third form, also having a short tail, but much darker than either *oregoni* or the Crater Lake species, was obtained by Mr. Streator at Agassiz, in British Columbia. The three forms constitute a very compact group (subgenus *Chilotus* Baird), differing from all the other Voles in a combination of characters which have been so recently summarized by Mr. Gerrit S. Miller, Jr., in his admirable paper on *The Genera of Voles and Lemmings** that it is unnecessary to repeat them here. The subgenus is restricted to the northwest coast region, where it ranges from the northwestern corner of California (Crescent City) to southern British Columbia (Port Moody and Agassiz). The extreme northern and southern limits of its range have not been determined. *M. bairdi* is clearly a mountain animal, confined to the Cascade Range, but the data at present available are not sufficient to admit of mapping the distinctive ranges of *oregoni* and *serpens*.

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* North Am. Fauna, No. 12, pp. 60-62, July, 1896.

The three species here recognized agree almost exactly in size, the only difference being that the tail of *oregoni* is about 10 millimeters longer than that of either of the others. In color *oregoni* holds an intermediate position, *bairdi* being the palest and *serpens* the darkest of the three.

Following are descriptions of the known species:

Microtus oregoni (Bachman.)

Arvicola oregoni Bachman, Journ. Acad. Nat. Sci., Phila., VIII, pt. 1, 60–61, 1839.

Type locality.—Astoria, Oregon.

General characters.—Size rather small; pelage short and coarse with a decided 'pepper and salt' appearance; tail longer and ears more prominent than in the other members of the subgenus.

Color.—Upper parts brownish bister; under parts dark, more or less washed with buffy; tail blackish above, paler below.

Cranial characters.—Compared with the other known members of the subgenus (*bairdi* and *serpens*) the braincase is narrower, less flattened, and less subquadrate, the interparietal larger and more squarely rectangular, the zygomata more strongly bowed outward, the frontal more distinctly grooved interorbitally, and the ascending arms of the premaxillæ longer.

Measurements.—An adult ♂ from type locality: total length, 140; tail vertebræ, 42; hind foot, 17.

Microtus bairdi sp. nov.

Type from Glacier Peak, Crater Lake, Oregon (altitude about 7800 feet, or 2350 meters). No. 79906, ♀ ad., U. S. Nat. Mus., Biological Survey collection. Collected August 24, 1896, by C. Hart Merriam and Vernon Bailey. Original No. 5813.

General characters.—Size small, a little smaller than *M. oregoni;* ears and tail rather short; coloration pale.

Color.—Upper parts uniform rather pale grayish bister, with a faint reddish brown cast, and glossy; under parts whitish, the plumbeous basal fur showing through; tail bicolor; dark above, whitish beneath; feet soiled whitish; nose dusky.

Cranial characters.—Skull rather small and flat; braincase subquadrate (broad in type specimen); zygomata bowed well outward; rostrum short; audital bullæ large and well rounded; incisive foramina short, not reaching nearly to incisors. Compared with *M. oregoni* the rostrum as seen from above is much shorter.

The dental characters are those of the subgenus *Chilotus.*

Remarks.—This interesting new Vole may be distinguished at a glance from *M. oregoni* by its shorter ears and tail and very much paler color. I have named it in honor of Professor Baird, who first recognized and named the subgenus.

Measurements.—Type specimen (♀ adult): total length, 131; tail vertebræ, 33; hind foot, 17.5. A young adult ♂ from type locality: total length, 130; tail vertebræ, 32; hind foot, 17.

Microtus serpens sp. nov.

Type from Agassiz, British Columbia. No. 76303, ♂ ad., U. S. Nat. Mus., Biological Survey collection. Collected December 2, 1895, by Clark P. Streator. Original No. 5068.

General characters.—Similar to *M. oregoni*, but tail much shorter; color darker; pelage much softer and longer (10 mm. or more on back in winter specimens); ears buried in the long fur.

Color.—Upper parts very dark brown, becoming almost dusky on posterior half of back, and everywhere profusely mixed with black-tipped hairs; under parts dark plumbeous, the belly washed with ashy or buffy; tail dusky above, pale below, and faintly edged and tipped with whitish when seen from above (due to the projection of the whitish hairs of the under side).

Cranial characters.—Skull similar to that of *M. oregoni*, but slightly larger; interorbital region less 'pinched in;' interparietal tapering off more gradually on each side; teeth larger; crowns of molar series longer.

Measurements.—Type specimen: total length, 130; tail vertebræ, 31; hind foot, 18. Average of seven specimens from type locality: total length, 130; tail vertebræ, 32; hind foot, 17.5.

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PROCEEDINGS

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SYNOPSIS OF THE VOLES OF THE GENUS *PHENACOMYS*.

BY GERRIT S. MILLER, JR.

With the possible exception of some bones and teeth found in a cave in southern Hungary and described by Nehring in 1883, no specimens of voles of the genus *Phenacomys* were brought to notice until about eight years ago. In October, 1889, Dr. C. Hart Merriam first defined the genus and described four specimens, two from Labrador, one from Quebec, and one from British Columbia, each of which he made the type of a new species. In 1890 Mr. F. W. True described a fifth species from Oregon. A year later Dr. Merriam discovered still another in Idaho. In 1894 Dr. J. A. Allen described a seventh form supposed to be from the Black Hills of South Dakota. During the following year Mr. S. N. Rhoads named an eighth from British Columbia. Finally, Dr. Merriam has recently described a ninth species from Colorado. In addition to these descriptions of new species, several minor references to the genus have been published. Of these the most important is that by Nehring, in which the remains from the cave in southern Hungary, already referred to, are determined as those of *Phenacomys*.*

As might be inferred from this summary, the material by which the genus is represented in collections has greatly increased since the first specimens were described. Now there are not far from one hundred well-prepared skins available for examination.* This material shows that, of the nine described forms, the following six are valid:

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* Full references to all these papers are given in the bibliography at the end of this article.

Name.	*Type locality.*
P. intermedius Merriam	Kamloops, British Columbia.
P. orophilus Merriam	Salmon River Mountains, Idaho.
P. preblei Merriam.	Longs Peak, Colorado.
P. latimanus Merriam	Fort Chimo, Ungava, Labrador.
P. ungava Merriam	Fort Chimo, Ungava, Labrador.
P. longicaudus True	Marshfield, Coos County, Oregon.

These fall naturally into three groups, each of which occupies a different geographic region. The *ungava* group, containing two well-marked yellow-faced species, *ungava* and *latimanus*, ranges from Quebec and Labrador west at least as far as the north shore of Lake Superior. The *intermedius* group, with three slightly differentiated uniformly grayish or ochraceous species, *intermedius*, *orophilus*, and *preblei*, occupies the mountains of British Columbia, Alberta, and the northwestern United States. The third or *longicaudus* group is represented by one species only, the very aberrant *P. longicaudus* of the humid coast district of Oregon.

The species of *Phenacomys* are voles of medium or small size. With the exception of *P. longicaudus*, which is remarkable for its very long tail, there is nothing in the external appearance of any to distinguish them from small species of *Microtus*. They generally inhabit dry, grassy plains and mountain parks, but *P. longicaudus* appears to be strictly arboreal. At present all the species definitely known are American. The determination of the European fossil remains is open to question.†

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* The specimens examined in the present connection are distributed as follows: U. S. National Museum, 64, including the types of *P. longicaudus*, *P. orophilus*, *P. truei*, and *P. preblei* (all but two of these are in the Biological Survey collection); Museum of the Canadian Geological and Natural History Survey, 1 (type of *P. intermedius*); Merriam collection, 3 (types of *P. celatus*, *P. ungava*, and *P. latimanus*); Bangs collection, 16 *P. ungava* from Hamilton Inlet, Labrador; Miller collection, 7 *P. latimanus* from the north shore of Lake Superior, and 4 *P. orophilus* from Mount Baker, British Columbia (topotypes of *P. oramontis*).

† See North American Fauna, No. 12, p. 40.

Genus PHENACOMYS Merriam.

Phenacomys Merriam, North American Fauna, No. 2, p. 28, October 30, 1889.

Type species.—Phenacomys intermedius Merriam.

Geographic distribution.—Boreal North America from Atlantic to Pacific, south to the Gulf of Saint Lawrence, the north shore of Lake Superior, the coast of Oregon, and in the Rocky Mountains to Colorado.

Generic characters.—Skull and teeth in general as in *Microtus*, but molars distinctly two-rooted in the adult, and root of lower incisor never reaching level of dental foramen. Reëntrant angles on inner side of lower molars very much deeper than those of outer side, not approximately equal to outer angles as in *Microtus* and *Evotomys*.

Remarks.—Phenacomys combines the palate, heavily built angular skull, and strong sharply angled teeth of *Microtus* with the rooted molars and short lower incisors of *Evotomys*. It differs from both *Microtus* and *Evotomys* in the relatively great depth of the inner reëntrant angles of the mandibular molars.

KEY TO THE SPECIES OF PHENACOMYS.

Tail about 40 percent of total length.......................... *longicaudus.*
Tail about 25 percent of total length.
Face and muzzle reddish or yellowish in strong contrast with rest of head.
Skull of adult with deep frontal sulcus .... *ungava.*
Skull of adult without frontal sulcus. .... *latimanus.*
Face and muzzle essentially same color as rest of head.
Ascending branches of premaxillæ broad........... *intermedius.*
Ascending branches of premaxillæ narrow.
Color decidedly ochraceous.................... *preblei.*
Color gray.. *orophilus.*

Phenacomys intermedius Merriam.

Phenacomys intermedius Merriam, North American Fauna, No. 2, p. 32, October 30, 1889.

Type locality.—Basaltic plateau about 20 miles NNW. of Kamloops, British Columbia. Altitude 5,500 feet. Type No. 780, Mus. Geol. and Nat Hist. Surv. Canada. Collected by Dr. Geo. M. Dawson.

Geographic distribution.—Phenacomys intermedius is known from the type locality only.

General characters.—Size small; general color pale; feet light brown; skull with interorbital region and ascending branches of premaxillæ very broad; front lower molar with five well developed salient angles on outer side.

Color.—Back grizzled grayish brown with a yellowish tinge, everywhere sprinkled with black-tipped hairs which are most numerous on middle of back and over lumbar region; belly grayish white, the deep plumbeous bases of the hairs showing through; tail sharply bicolor, nearly black above, white beneath; feet light brownish; whiskers mixed blackish and silvery gray.

Skull.—The skull of the type and only known specimen of *Phenacomys intermedius* is so badly broken that many of its characters cannot be ascertained. Enough remains to show two peculiarities which are not shared by any of the numerous skulls of *P. orophilus* with which I have compared it. These are the great breadth of the interorbital region (4 mm. at narrowest part of constriction) and the expanded terminations of the ascending branches of the premaxillæ. The latter character is approached in the type specimen of *P. preblei.* The rostrum appears slightly shorter and deeper than in *P. orophilus*, but this is probably only an optical effect due to the imperfect condition of the nasal bones.

Teeth.—The enamel pattern is essentially the same as that of *P. orophilus*, except that the anterior loop of the front lower molar is so deeply cut by reëntrant angles that a third outer triangle is wholly isolated and a fourth inner triangle is nearly cut off. As a result the transverse loop is reduced to a narrow crescent placed obliquely with the convexity directed forward and outward.

Measurements.—"Total length, about 118; tail vertebræ, 28; hind foot, 18; ear from anterior root, 13 (from dry skin)"—Merriam.

General remarks.—The type specimen of *Phenacomys intermedius*, although imperfect, shows too many differences from any of the other described forms to be united with them. The breadth of the interorbital region is a character of trifling importance, and one which might easily disappear with increasing age, but the great expansion of the ascending branches of the premaxillæ is scarcely to be explained in this way. The peculiarities of the front lower molar are not of a kind likely to be the result of immaturity, and if they are purely individual they represent a degree of variability far in excess of that presented by other known species of the genus. As the skin is now sealed between two glass plates, it is not possible to determine with certainty the character of the fur, but it appears to be less dense and woolly than in *P. orophilus.* In color the type shows no distinct differences from *P. orophilus*, except that the feet are light brown instead of white.

Phenacomys orophilus Merriam.

Phenacomys orophilus Merriam, North American Fauna, No. 5, p. 65, July 30, 1891.

Phenacomys truei Allen, Bull. Am. Mus. Nat. Hist., VI, p. 331, November 7, 1894.

Phenacomys oramontis Rhoads, American Naturalist, XXIX, p. 941, October, 1895.

Type locality.—Salmon River Mountains, Idaho (near head of Timber Creek; altitude, 10,500 feet). Type in U. S. National Museum (♀ adult, No. $\frac{23856}{31256}$).

Geographic distribution.—Hudsonian zone and parts of Canadian zone, in the mountains of Alberta, British Columbia, and the western United States south to southern Wyoming, central Idaho, and south central Oregon.

General characters.—Size small; fur dense and woolly; general color light gray, somewhat tinged with yellowish; feet nearly white; interorbital region of skull narrow and smooth; ascending branches of premaxillæ narrow.

Color.—Back grizzled grayish brown, with a yellowish tinge, which is most distinct in spring and summer specimens, the fur everywhere thickly sprinkled with blackish hairs, which, however, do not form a distinct dark dorsal area; face with very few blackish hairs, but not yellower than back; belly dirty white; feet silvery whitish; tail sharply bicolor, pure white below, mixed brown and white above; under fur dark plumbeous, this color showing through irregularly on belly and throat. The young are clearer gray than the adults, but otherwise similar.

Skull.—The skull of *Phenacomys orophilus* is of medium size, that of the type measuring 23.1 mm. in basilar length and 14.2 mm. in zygomatic breadth. The interorbital constriction is narrow, and the frontal ridges, even in very old skulls, are too slightly developed to form a frontal sulcus; ascending branches of premaxillaries narrow and scarcely expanded posteriorly; jugal broadly expanded and mortised into zygomatic process of maxillary.

Teeth.—The enamel pattern shows no distinctive characters as compared with the species of the *ungava* group. The anterior loop of the front lower molar is unusually variable in form, but in the majority of specimens is similar to that of *P. latimanus.*

Measurements.—Type specimen: total length, 146; tail vertebræ, 38; hind foot, 19; average of eight adults from Bear Tooth Mountains, Montana: total length, 146.5; tail vertebræ, 31.8; hind foot, 17.7; average of ten adults from St. Marys Lake, Montana: total length, 141.7; tail vertebræ, 34.5; hind foot, 17.7; average of three adults from type locality of *P. oramontis:* total length, 144.6; tail vertebræ, 37.5; hind foot, 19.3.

Specimens examined.—Total number, 56.

Wyoming: Near Laramie, 1 (type of *P. truei*); Tower Falls, Yellowstone Park, 1.

Montana: Bear Tooth Mountains, 23; Big Snowy Mountains, 1; Midvale, 1; St. Marys Lake, 12; Summit, 1.

Idaho: Salmon River Mountains, 4; Sawtooth City, 2.

Oregon: Blue Mountains (10 miles north of Harney), 1; Crater Lake, 2; Diamond Lake, 1; Mount Hood, 1.

British Columbia: Mount Baker Range, 4 (topotypes of *P. orophilus*).

Alberta: Ninety miles north of Jasper House, 1.

General remarks.—*Phenacomys orophilus* is distinguishable from all other species except *P. intermedius* by its combination of short tail, gray face, and pale color. From *P. intermedius* it differs in cranial and dental characters.

The range of this species is not continuous, but is interrupted wherever the mountains are not high enough to be capped by a Hudsonian area of sufficient extent. As might be expected, members of the various colonies differ from each other. These differences are, however, too slight to be worthy of recognition by name. The most northerly specimen that I have seen, a female collected at Fishing Lake, Alberta, on September 17, 1896 (No. 81477, U. S. National Museum, Biological Survey collection), has the fur much less thick and woolly than in typical *orophilus.* The feet are brownish as in *P. intermedius*, but in all other characters it agrees perfectly with *orophilus.* Specimens from St. Marys Lake, Montana, average a trifle smaller than those from the type locality.

Since *Phenacomys orophilus* was first described it has received two additional names. The first of these, *P. truei* Allen, was based on the distorted skin and fragmentary skull of a young animal supposed to have been taken in the Black Hills of South Dakota, a region so isolated that if inhabited by the genus it would be expected to furnish a species different from those occurring farther west. The type specimen is, however, exactly like immature *orophilus* in color and in enamel pattern. In size it agrees perfectly except that the tail, in its present condition (a few of the proximal vertebræ removed, the rest dried in the skin), is about 7 millimeters shorter than in fresh specimens of the same age. No weight can be attached to this one difference in the absence of all others. Furthermore, it is practically certain that the type was not collected in the Black Hills of South Dakota, but in the Black Hills of Wyoming, now known as the Laramie Mountains. It was taken on August 10, 1857, by Dr. Hammond, a member of the expedition commanded by Lieut. F. T. Bryan. I have not been able to find any account of the Bryan expedition of 1857 further than the statement, on page 91 of the eleventh volume of the Pacific Railroad Reports, that "the wagon-road expedition under Lieutenant Bryan this year [1857] was confined to routes which he had previously mapped and explored." The map of Bryan's routes shows that he never entered the region now known as the Black Hills, but that his course followed up the Platte River and Lodge Pole Creek through the Laramie Mountains. It is therefore almost beyond doubt that the type of *Phenacomys truei* was collected in Albany County or Laramie County, Wyoming, a few miles northeast of the present town of Laramie. This region is almost continuous with the mountains included in the known range of *orophilus. Phenacomys oramontis* Rhoads was based on a specimen from the Mount Baker range in British Columbia, just north of the United States boundary. Four topotypes in my collection are indistinguishable from *P. orophilus.*

Phenacomys preblei Merriam.

Phenacomys preblei Merriam, Proc. Biol. Soc. Washington, X, p. 45, March 16, 1897.

Type locality.—Longs Peak, Colorado. Type in U. S. National Museum (♂ adult, No. 74513), Biological Survey collection.

Geographic distribution.—Phenacomys preblei is at present known from the type locality only.

General characters.—Most like *P. orophilus*, but color much more ochraceous and ascending branches of premaxillæ more expanded terminally.

Color.—Dorsal surface clay color suffused with ochraceous, the back thickly sprinkled with black-tipped hairs; feet dirty white; belly yellowish white, the plumbeous under fur showing through irregularly; tail indistinctly bicolor, brownish above, whitish below.

Skull.—The skull is similar to that of *P. orophilus*, but the interorbital ridges are slightly more developed (though not enough to form a median sulcus), the terminal portion of the ascending branch of the premaxilla is broader and the jugal is scarcely mortised into the zygomatic arm of the maxillary.

Teeth.—Not appreciably different from those of *P. orophilus.*

Specimens examined.—One, the type.

General remarks.—*Phenacomys preblei* is closely related to *P. orophilus*, from which it differs in yellower color and some slight cranial characters. In one of the latter it approaches *P. intermedius.*

Phenacomys latimanus Merriam.

Phenacomys latimanus Merriam, North American Fauna No. 2, p. 34, October 30, 1889.

Type locality.—Fort Chimo, Ungava, Labrador.

Geographic distribution.—Arctic and Hudsonian zones from northwestern Labrador to the north shore of Lake Superior. Limits of range not known.

General characters.—Size small; skull never developing sharply defined interorbital ridges, even in extreme old age; muzzle and face conspicuously yellower than rest of head.

Color.—Dorsal surface pale yellowish cinnamon-brown, clearer and more tinged with reddish on muzzle and face; region from eyes to base of tail strongly shaded with blackish hairs; feet and whole ventral surface whitish gray, the throat and belly somewhat darkened by the plumbeous bases of the hairs; no distinct line of demarkation on sides, but color of belly shading abruptly into that of back; tail sharply bicolor, dark brown above, whitish below; ears concolor with surrounding parts, but region immediately behind ear generally paler.

Skull.—The skulls of adult specimens vary in basal length from 20 to 22 mm., and in zygomatic breadth from 13 to 14 mm.; rostrum moderate (nasals contained about three and one-half times in occipito-nasal length) rather more lightly built than in *P. ungava*, and with profile usually more deflected from dorsal outline of frontals; interorbital region faintly concave, never distinctly sulcate.

Teeth.—The enamel pattern of this species calls for no special remark. The anterior loop of the front lower molar is usually cut on the inner side by a deep reëntrant angle, which is so much deeper than that on the outer side as to destroy the bilateral symmetry of the loop. This character occurs in other species, notably *P. orophilus*, but it appears to be more constant in *P. latimanus* than any other.

Measurements.—Type specimen "(from alcoholic before skinning): total length, 116; tail vertebræ, 28; hind foot, 18" (Merriam); seven adults from Peninsula Harbor, Ontario (north shore of Lake Superior), average: total length, 134; tail vertebræ, 29.9; hind foot, 18.1; maximum: total length, 150; tail vertebræ, 38; hind foot, 19.

General remarks.—*Phenacomys latimanus* is recognizable as a member of the *ungava* group by its distinctly fulvous face. From *P. ungava* it differs in its smaller size and smooth interorbital region.

Phenacomys ungava Merriam.*

Phenacomys celatus Merriam, North American Fauna, No. 2, p. 33, October 30, 1889. Godbout, Province of Quebec, Canada (based on old skull, with subquadrate interparietal).

Phenacomys ungava Merriam, North American Fauna, No. 2, p. 35, October 30, 1889. Fort Chimo, Ungava, Labrador (based on young adult skull, with transversely lengthened interparietal).

Type locality.—Fort Chimo, Ungava, Labrador. Type in Merriam collection (♂ adult, No. $\frac{5468}{6155}$).

Geographic distribution.—Labrador and eastern Quebec. Not known from any point south of the lower edge of the Hudsonian zone.

General characters.—Size large; skull of adult with high interorbital ridges limiting a deep frontal sulcus; muzzle and face conspicuously yellower than rest of head.

Color.—Essentially as in *P. latimanus;* young darker and more plumbeous, at first without the cinnamon of the adult; tail of young specimens nearly uniform dusky, only slightly paler below.

Skull.—The skulls of adult specimens vary in basilar length from 22 to 25 mm. and in zygomatic breadth from 14 to 16 mm. Rostrum rather more heavily built than in *P. latimanus* and with profile usually less deflected from dorsal outline of frontals; interorbital region with two strongly developed ridges, between which lies a conspicuous trough which increases in depth and narrowness in old age

Teeth.—Except for their larger size, the teeth of *P. ungava* do not differ in any constant character from those of *P. latimanus.* The anterior loop of the front lower molar is, however, less frequently cut by a deep reëntrant angle on the inner side.

Measurements.—Type of *P. ungava* "(from alcoholic specimen before

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*I am aware that in the original paper on the genus the specific name *ungava* is printed two pages beyond the name *celatus.* To assume, however, that of alternative names the one which stands first in a book has by virtue of mere position precedence over others is as unreasonable as to assume that the first species mentioned under a composite genus should, other things being equal, necessarily become the type. As priority dates from publication, and publication is distribution, it is impossible for one name to have priority over another issued with it; hence to displace the name *ungava* as here used it will be necessary to show that the animal has an older name, that is, one published prior to October 30, 1889.

skinning): total length, 138; tail vertebræ, 31; hind foot, 19" (Merriam). Type of *P. celatus* "(from alcoholic specimen before skinning): total length about 130; tail vertebræ, 32; hind foot, 17.5" (Merriam). In adult male from Godbout, Quebec (topotype of *celatus*), in alcohol: total length, 137; tail vertebræ, 32; hind foot, 18. Ten adults from Hamilton Inlet, Labrador: average, total length, 151; tail vertebræ, 37; hind foot, 20; maximum, total length, 160; tail vertebræ, 44; hind foot, 21.

Specimens examined.—Total number, 19.

Labrador: Fort Chimo, Ungava, 1 (type); Hamilton Inlet, 16; Groswater Bay, 2 (skulls).

Quebec: Godbout 4 (including type of *celatus*).

General remarks.—Phenacomys ungava is distinguished from *P. latimanus*, the only other known species with yellowish face, by its larger size and strongly ridged interorbital region. The specimens from Hamilton Inlet average considerably larger than the type of *P. ungava* or the two adults from Godbout, Quebec, but as they agree in all other characters it seems unwise to separate them on the basis of the material now at hand. This series shows individual variation sufficient to cover the supposed differences between *P. ungava* and *P. celatus*.

Phenacomys longicaudus True.

Phenacomys longicaudus True, Proc. U. S. National Museum, XIII, p. 303, November 15, 1890.

Type locality.—Marshfield, Coos County, Oregon. Type in U. S. National Museum (young adult No. $\frac{19071}{25883}$).

Geographic distribution.—The species is at present known from two specimens only, the type and one from Meadows, Lane County, Oregon. It probably ranges throughout the densely forested coast district of Oregon·

General characters.—Size large; tail about 40 percent of total length; color rusty brown or drab.

Color.—Type (taken in August, 1890); head, back, and sides rusty brown, slightly duller along middle of back, the fur everywhere dark plumbeous at base and sprinkled with long blackish hairs, which, however, are not noticeable except on close examination; ventral surface rusty white, the plumbeous bases of the hairs showing through irregularly; tail unicolor, dark brown both above and below; feet dusky. The Lane County specimen (♀ No. $\frac{30649}{42621}$, U. S. National Museum, Biological Survey collection), taken on April 13, 1891, is wholly unlike the type in color. Head, back, and sides pale yellowish drab, the fur light bluish plumbeous at base and sprinkled with inconspicuous dark hairs; belly grayish white, the bluish bases of the hairs showing through irregularly; tail indistinctly bicolor, light slaty gray above and at tip, whitish mixed with gray below; feet silvery white.

Skull.—The skull of the type is in fragments, and that of the Lane County specimen cannot now be found, hence the cranial characters of *Phenacomys longicaudus* are at present unknown.

Teeth.—The teeth of *Phenacomys longicaudus* differ from those of the other species in the reduction in width of the inner triangles of the upper molars. This tendency is especially marked in the posterior inner triangles of the first and second teeth. In these the anterior face of the prism is nearly parallel with the anterior side of the second external reëntrant angle. The anterior transverse loop of the posterior upper molar is narrower than in other members of the genus and the terminal loop of the same tooth is considerably shortened. In the lower jaw the enamel pattern shows no characters beyond a general tendency to narrowness of all loops and triangles.

Measurements.—Type specimen "(from skin): total length, 148; tail vertebræ, 58; hind foot, 20.2" (True). Lane County specimen: total length, 165; tail vertebræ, 63; hind foot, 20.8 (from fresh specimen by the collector, A. Todd).

General remarks.—Phenacomys longicaudus differs so strikingly in proportions and color from all other members of the genus that it cannot be compared with any. Its appearance is unique among the voles, though faintly suggested by some of the Asiatic species of *Alticola.*

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PROCEEDINGS

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SYNOPSIS OF THE AMERICAN SESARMÆ, WITH DESCRIPTION OF A NEW SPECIES.[1]

BY MARY J. RATHBUN.

The American species of *Sesarma* are in much confusion, owing partly to incomplete descriptions and to the study of isolated specimens. The following is a key to all the species known to occur in America, with their principal synonyms, based on a study of types. One new species is described from the Museum at Copenhagen by permission of Dr. F. Meinert.

Sesarma Say.

Synopsis of American Species.

A. Carapace with a tooth behind the outer orbital tooth.
  B. Manus with two or more pectinated ridges on the upper surface.
    Subgenus *Perisesarma* de Man. *africana*[2] * Milne Edwards.
  B′. Manus without pectinated ridges on the upper surface.
    Subgenus *Sesarma* = *Episesarma* de Man.
    C. Front less than half the greatest width of the carapace.
      bidentata * Benedict.
    C′. Front more than half the greatest width of the carapace.
      D. Upper surface smooth.
        E. Eyes reaching the outer angle of the orbit.
          curacaoensis de Man.
        E′. Eyes not reaching the outer angle of the orbit.
          reticulata[3] Say.

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[1] Published with the permission of the Secretary of the Smithsonian Institution.

[2] Occurs at Barbados.

[3] Type species of the genus.

* Type examined by the writer.

D′. Upper surface rugose.
E. Hand very broad. *sulcata* Smith.
E′. Hand elongate. *crassipes*† Cano.
A′. Carapace without a tooth behind the outer orbital tooth.
B. Manus with two or more pectinated ridges on the upper surface. Subgenus *Parasesarma*[1] de Man.
B′. Manus without two or more pectinated ridges on the upper surface. Subgenus *Holometopus* Milne Edwards = subgenus *Sesarma* de Man.
C. Sides of carapace converging rapidly posteriorly. *rubripes* Rathbun, new name = *mülleri* Miers.*[2]
C′. Sides of carapace not converging rapidly posteriorly.
D. Protogastric or supra-frontal lobes tuberculate or granulate.
E. Movable finger extraordinarily enlarged along its proximal half. *benedicti* Rathbun, new name = *recta* de Man.[3]
E′. Movable finger not extraordinarily enlarged along its proximal half.
F. Outer surface of hand densely hairy at base of fingers. *barbimana* † Cano.
F′. Outer surface of hand not densely hairy at base of fingers.
G. Meri of ambulatory legs less than twice as long as broad. *recta* * Randall = *mullerii* * A. Milne Edwards.
G′. Meri of ambulatory legs more than twice as long as broad.
H. Front widening considerably toward the lower margin. *miersii*[4] Rathbun, new name = "*angustipes ?*" Miers,* 1881 = *stimpsonii* Miers, 1886,* not 1881.
H′. Front not widening considerably toward the lower margin.
J. Protogastric or supra-frontal lobes faintly granulate. *cinerea* Bosc.
J′. Protogastric or supra-frontal lobes rough with rugæ or lines of granulations.
K. Front not more than 3½ times as wide as high. *occidentalis* * Smith.
K′. Front more than 3½ times as wide as high.
L. Margins of meri of ambulatory legs subparallel for their distal half. *roberti** Milne Edwards = *americana** Pocock = *bromeliarum** Rathbun.

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[1] Not represented in America.

[2] Challenger Report, Zoöl. XVII, 270, pl. xxi, f. 3, 1886, Bahia.

[3] Notes Leyden Mus., XIV, 249, pl. X, f. 4, 1892, Surinam.

[4] This species has not been sufficiently characterized and is described below.

* Type examined by the writer.

† Not seen by the writer.

L′. Margins of meri of ambulatory legs converging from the middle towards the carpal joints.

M. Front deeply concave; protogastric lobes strongly projecting. *angusta* * Smith.

M′. Front slightly concave; protogastric lobes slightly projecting.
angustipes Dana = *americana* * Saussure.

D′. Protogastric or supra-frontal lobes smooth or nearly so.

E. Front less than 4 times as wide as high.
ricordi * Milne Edwards = *guerini* * Milne Edwards = *miniata* * Saussure = *angustipes* Stimpson (in part,* at least) = *angustipes* Smith * = *stimpsonii* Miers,* 1881, not 1886, = *cinerea* Heilprin,* 1888, = *cinerea* Ives,* 1891.

E′. Front more than 4 times as wide as high.
hanseni Rathbun, new species.

Sesarma (Holometopus) miersii Rathbun, new name.

Sesarma angustipes? Miers, Proc. Zoöl. Soc. London, 1881, 70, Rat Island, Monte Video.

Sesarma stimpsonii Miers, Challenger Rept., Zoöl., XVII, 270, 1886; not *S. stimpsonii* Miers, 1881.

Carapace broader than long, of equal width anteriorly and posteriorly, surface more convex than in *S. cinerea*, regions deeply marked. Carapace, as in *S. roberti*, punctate, the punctæ crowded in places and tending to coalesce; anterior portion rough with tubercles. Except for its width, the carapace has great resemblance to that of *S. roberti*.

Front less than four times as wide as high. Superior lobes less prominent than in *S. roberti*. The middle sinus of the lower margin when viewed from above is much shallower and less rounding than in that species. Viewed from in front the lower margin forms an almost unbroken convex line. The side margins of the front diverge below as in *S. ricordi*.

The lateral margins of the third abdominal segment of the male are arcuate, the abdomen being widest posterior to the distal end of that segment. The terminal segment is as wide as it is long. The appendages terminate in an oblique sinuous margin fringed with hair.

The chelipeds resemble pretty closely those of *S. roberti*. The meri of the ambulatory legs are shorter than in that species, being less than 2½ times as long as wide in the first, third, and fourth pairs, and a little more than 2½ times the width in the second pair. Propodi of first and second pairs hairy above and below; those of the third and fourth pairs hairy only on the distal portion.

Dimensions.—♂, Abaco, Bahamas, U. S. Nat. Mus., No. 11372: Length, 19.3 mm.; width, anterior and posterior, 21.1; superior frontal width, 11; inferior, 11.6; depth of front, 3; length of merus of third ambulatory leg, 15.3; width of same, 6.3. In some specimens the posterior width is greater than the anterior; the width of the ambulatory legs is also variable, but as a rule the meri are shorter than in *S. roberti.*

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* Type examined by the writer.

Distribution.—Abaco and San Salvador, Bahamas; Swan Island, Caribbean Sea (U. S. Nat. Mus.). Destero, Brazil (Paris Mus.). Rio de Janeiro; Rat Island, Monte Video, type locality (Brit. Mus.)

Sesarma (**Holometopus**) **hanseni** Rathbun, new species.

Carapace much broader than long, broader anteriorly than posteriorly. Regions well marked; mesogastric very wide behind, and with a curved sulcus parallel to its posterior margin. Surface smooth and punctate and without granulations. Superior margin of front uneven, the inner lobes sloping backward from the middle. Front more than 4 times as wide as high; margin projecting, thin, arcuate in a front view, slightly sinuous in a dorsal view. Terminal segment of abdomen broader than long. Appendages narrow and with slender curved tips.

Merus and carpus of chelipeds with outer surface covered with broken rugose lines; margins denticulate. Hand deep, covered with depressed tubercles; superior margin with a thin denticulate crest. Fingers irregularly toothed; the largest tooth of the dactylus is midway of its length, and fits between the two largest teeth of the pollex. The meri of the ambulatory legs are less than 2½ times their width.

Dimensions.—♂: Length, 13.5 mm.; exorbital width, 16.6; posterior width, 15.5; superior frontal width, 9.5; depth of front, 2; length of merus of fourth ambulatory leg, 8; width, 3.7.

Type locality.—West Indies, one ♂ (Copenhagen Mus.).

Dedicated to Dr. H. F. Hansen.

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PROCEEDINGS

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SYNOPSIS OF THE AMERICAN SPECIES OF *PALICUS* PHILIPPI* (= *CYMOPOLIA* † ROUX), WITH DESCRIPTIONS OF SIX NEW SPECIES.‡

BY MARY J. RATHBUN.

The following summary is based on a study of the specimens collected by the steamers 'Bache,' 'Blake,'§ and 'Albatross,' and is preliminary to a complete report on the genus.

The genus *Palicus* is remarkable not only as the sole representative of a family, but as exhibiting two forms in the male of at least one species (*P. alternatus*).

SYNOPSIS OF AMERICAN SPECIES.

A. Length of second ambulatory leg less than twice the width of the carapace.

- B. Crests on the second and third abdominal segments, and on the fifth sternal segment not forming conspicuous laminiform expansions visible in a dorsal view.
  - C. Meri of ambulatory legs with strongly dentate anterior crest. Lateral margin of carapace with 4 teeth besides the orbital. *cristatipes* A. Milne Edwards.

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* I have not seen the following paper by Philippi, "*Palicus granulatus*, ein neues Genus der rückenfüssigen Krabben." <Zweiter Jahresber. d. Vereins f. Naturk. in Cassel, 11, 1838. Specimens of *Cymopolia caronii* Roux, bearing the inscription '*Palicus granulatus*,' are preserved in the Museum at Berlin, and are perhaps Philippi's types.

† *Cymopolia* used by Lamouroux, Hist. Pol. Coral. Flex., 292, 1816, for a genus of polyps.

‡ Published with the permission of the Secretary of the Smithsonian Institution.

§ Examined through the courtesy of Professor Agassiz.

C′. Meri without strongly dentate anterior crest. Lateral margin of carapace with less than four teeth besides the orbital.

D. Anterior margin of meri of second and third ambulatory legs terminating in a nearly rectangular non-projecting tooth.

E. Lateral teeth of carapace dentiform, acute, scarcely projecting beyond the margin of the carapace. *zonatus* Rathbun.

E′. Lateral teeth tuberculiform or lobiform, projecting from the margin of the carapace.

F. Two frontal lobes, each bilobed. *alternatus* Rathbun, new species.

F′. Two frontal lobes, each obscurely emarginate. *isthmius* Rathbun, new species.

D′. Anterior margin of meri of second and third ambulatory legs terminating in a spiniform, projecting tooth.

E. Lateral margin of carapace with three teeth besides the orbital. *tuberculatus* Faxon.

E′. Lateral margin with two teeth besides the orbital.

F. Branchial regions much swollen. *obesus* A. Milne Edwards.

F′. Branchial regions not swollen.

G. Granules of carapace very fine, not visible to the naked eye. *dentatus* A. Milne Edwards.

G′. Granules of carapace coarse. *faxoni* Rathbun, new species.

B′. Crests on the second and third abdominal segments and on the fifth sternal segment forming conspicuous laminiform expansions visible in a dorsal view.

C. Posterior margins of laminiform crests of first and second abdominal segments subparallel in a dorsal view. *bahamensis* Rathbun, new species.

C′. Posterior margins of laminiform crests of first and second abdominal segments not subparallel, that of the second having a greater median expansion.

D. Ridge above the posterior margin of the carapace one unbroken curve; distal end of meri of ambulatory legs without a tooth. *depressus* Rathbun, new species.

D′. Ridge above the posterior margin sinuous; distal end of meri with a tooth.

E. Length of carapace more than $\frac{4}{5}$ its width. *angustus* Rathbun, new species.

E′. Length of carapace $\frac{4}{5}$ its width or less. *sica* A. Milne Edwards (restricted).

A′. Length of second ambulatory leg more than twice the width of the carapace.

B. Front with two teeth.

C. Chelipeds smooth. *gracilipes* A. Milne Edwards.

C′. Chelipeds tuberculate. *acutifrons* A. Milne Edwards.

B′. Front with four teeth.

C. Lateral teeth 4 besides the orbital. *fragilis* Rathbun.

C′. Lateral teeth less than 4 besides the orbital.

D. Median suborbital lobe midway between the outer and inner lobes.
cursor A. Milne Edwards = *dilatata* A. Milne Edwards.

D′. Median suborbital lobe much nearer the outer than the inner lobe. *gracilis* Smith.

Palicus alternatus Rathbun, new species.

Carapace subquadrate, coarsely granulate. Front with four distinct lobes, the median pair smaller and more deeply separated from each other than from the outer pair. Superior orbital lobes subquadrate. Outer margin of outer orbital tooth nearly straight. Median lobe of inferior margin most advanced at its inner angle. Lateral teeth two, broad, lobate, obtuse. In large specimens a third very small tooth or tubercle behind the second.

There are two forms of the male in this species. In one the appendages of the first segment of the abdomen are strong and twisted, the tip is bilobed, the inner lobe thinner and longer than the outer. In the second form the appendages are weaker and not twisted, the tip less spreading.

In the first form the chelipeds are very unequal, the left is always slender and weak, the right large and heavy. Both chelipeds are tuberculate and pubescent. The carpus is covered with irregular laminiform lobes; the manus is surmounted by a double crest of the same. The width of the right manus at its distal end equals one-half the length of the carapace. Pollex very short. Dactylus strongly bent down, overlapping the pollex at the tip. Left manus a little more than one-third the width of the right, enlarging but little towards the long and rather narrow fingers.

In the second form of the male the right manus is about twice the width of the left and its fingers are also long and slender. In the females the chelipeds are more nearly equal.

The second ambulatory leg is about twice the length of the carapace; the first reaches about the middle of the propodus of the second; the third reaches about the middle of the dactylus of the second. The meri are rough with squamose tubercles, and have two longitudinal grooves on the upper surface and one on the anterior surface. The anterior margin terminates in a blunt rectangular tooth in the second and third pairs; in the first pair this tooth is produced outward toward the carpus. Posterior margin of the dactyli concave as a whole, but nearly straight for the proximal two-thirds.

The two forms of the male agree in every respect excepting in the chelipeds and abdominal appendages. These forms perhaps represent alternating conditions in the life of an individual similar to those existing in the genus *Cambarus;* the first form that which occurs during the breeding season, the second that which occurs between breeding seasons. No other species of the genus exhibit this phenomenon, a fact which may be due to the scarcity of material collected and does not prove its nonexistence.*

Dimensions.—♂, form I: Length, 6.6 mm.; width, 7.6; length of second ambulatory leg, 14; length of merus, 4.4; carpus, 2.2; propodus, 3.6; dactylus, 3.2.

♂, form II: Length, 11 mm.; width, 13.2.

Distribution.—*P. alternatus* occurs in from 24 to 60 fathoms off Cape Hatteras, N. C., and in the Gulf of Mexico between the delta of the Mississippi and Cedar Keys, and from Cedar Keys to Florida Straits. It has been taken by the steamers 'Albatross' and 'Blake' and the schooner 'Grampus.'

Type locality.—Station 2374, str. 'Albatross,' lat. 29° 11′ 30″ N., long. 85° 29′ W., 26 fathoms (U. S. Nat. Mus., No. 19840).

Palicus faxoni Rathbun, new species.

Allied to *P. alternatus*, but longer and narrower; granules of the carapace similar in size; granulated tubercles of the branchial region more elevated and more squamose; median lobes of front more advanced; superior orbital lobes triangular and separated by wider sinuses than in *P. alternatus;* median lobe of the inferior margin subtruncate, inclining slightly forward toward the median line; lateral teeth of the carapace dentiform, acute, projecting outward and forward; ridge above the posterior margin with six linear and a few smaller tubercles.

Abdominal appendages of the single male examined slender, with long, slender tips; just posterior to the terminal portion there is a tridentate lobe on the inner side.

Chelipeds unequal, similar in the two sexes; the right propodus about twice the width of the left. They resemble strongly those of *P. alternatus*, ♂, form II.

Meri of second and third ambulatory legs characterized by a sharp spine at the end of the anterior margin; anterior margin spinulous; upper surface flatter and less coarsely granulate than in *P. alternatus*; last three joints wider than in that species; the dactyli differ in having the proximal half of the posterior margin convex.

Dimensions.—♀, station 2596: length, 9.5 mm.; width, 10.7; length of second ambulatory, 18; merus, 5.2; carpus, 3.1; propodus, 4.7; dactylus, 3.7. ♀, Yucatan Bank: length, 15.4; width, 17.3. ♂, station XXX, length, 9.5; width, 10.

Distribution.—Taken off Cape Hatteras by the 'Albatross,' station 2596 (*type*, U. S. Nat. Mus., No. 19841), and off Yucatan by the 'Blake,' station XXX; range in depth, 49 to 51 fathoms.

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* Professor Smith, in Proc. U. S. Nat. Mus., VI, 22, 1883, describes two forms of the male of *Ethusa microphthalma*, and suggests the possibility of their specific distinctness. They may, however, represent a case similar to that of *P. alternatus*.

Palicus isthmius Rathbun, new species.

Allied to *P. alternatus*, but broader. Carapace depressed. Front with median sinus broader than in *P. alternatus;* lateral lobes faintly marked. Preorbital lobe very sinuous, a small but well-marked tooth at its outer angle. Both superior orbital lobes triangular, obtuse. Median lobe of inferior margin subtruncate or slightly arcuate. Lateral teeth of carapace two, directed obliquely outward, the anterior lobiform, the posterior a little longer and subacute.

Chelipeds in the immature ♀ small and feeble, as in *P. alternatus.* Merus of the first pair of ambulatory legs with an acute spiniform tooth instead of the blunt tooth in *P. alternatus.* Meri of the second and third pairs with the distal angle thin and almost a right angle, tipped with a small sharp point. Carpi without lobes on their anterior margins. Third ambulatory leg very little shorter than the second.

Dimensions.—Immature ♀ : length, 5.8 mm.; width, 7; length of second ambulatory, 13.7; merus, 4; carpus, 2.5; propodus, 3.2; dactylus, 3.3.

Type locality.—One specimen only was dredged by the 'Albatross,' station 2145, near Aspinwall, latitude 9° 27′ N., longitude 79° 54′ W., 25 fathoms (U. S. Nat. Mus., No. 7753).

Palicus sica (A. Milne Edwards).
Palicus angustus Rathbun, new species.
Palicus depressus Rathbun, new species.

Cymopolia sica A. Milne Edwards, Bull. Mus. Comp. Zoöl., VIII, 29, 1880.

Among the specimens referred to *Cymopolia sica* by its author, there appear three distinct forms, which agree in the following characters: The carapace is granulate, many of the granules forming clusters on the more elevated regions. Front with four small, tuberculiform teeth, the median the most prominent, separated from each other by a deep triangular notch, and from the lateral teeth by very broad, shallow sinuses. The tooth of the superior orbital border nearest the preorbital is arcuate; the next narrower, also obtuse. The median suborbital lobe is subtriangular and much less advanced than the inner lobe. The lateral margin of the carapace bears three small, thickened teeth.

First segment of the abdomen with a narrow carina on either side behind the postero-lateral angle of the carapace. Second carinated throughout its width, the carina much longer in the center. Third segment carinated, but much less sharply. There is also a carina on the sternum in a line with the suture between the second and third abdominal segments; it extends well outwardly, but not so far posteriorly as the second abdominal. These carinæ form horizontal plates, visible in a dorsal view, excepting that of the third abdominal segment in the male.

Chelipeds slender and feeble. Ambulatory legs of moderate length, the third very little shorter than the second, the first very slender and reaching about midway of the carpus of the second. Meri of second and third with longitudinal rows of spinules and a deep groove on the anterior half; anterior distal angles subrectangular.

The three forms of so-called *sica*, which may be designated as Nos. 1, 2, and 3, differ mainly as follows: No. 2 is much narrower than Nos. 1 and 3; No. 3 is most depressed. Just above the posterior margin there is in No. 3 a continuous ridge following the curve of the margin; in Nos. 1 and 2 there is instead a sinuous line of tubercles, more uneven in No. 1 than in No. 2. Inner suborbital fissure a broader sinus in No. 1 than in Nos. 2 and 3. The median portion of the second abdominal plate is most prominent in No. 1 and least so in No. 3. Ischium of maxilliped much wider in Nos. 2 and 3 than in No. 1; in No. 3 widening considerably toward the merus. Merus of second ambulatory long and comparatively narrow in No. 1; short and very broad in the middle in No. 2, with very convex posterior outline; in No. 3 the merus is of moderate width proximally, but at the distal end is very narrow, with scarcely a trace of a tooth.

The description given by Professor Milne Edwards is applicable to all of the forms above described. Of the ambulatory legs he says, "Les deux derniers articles sont très aplatis et élargis." These articles are widest in No. 2. The dimensions given do not, however, apply to No. 2. I have therefore restricted the name "*sica*" to No. 1, the form taken in greatest abundance by the U. S. Coast Survey steamers 'Bache' and 'Blake.' Form No. 2 may be known as *Palicus angustus*, form No. 3 as *Palicus depressus*.

Dimensions.—In *P. sica* the width of the carapace varies from 1.25 times its length in smaller specimens to 1.39 times its length in larger specimens. Length of largest specimen, adult ♀, 9.8 mm.; width, 13.5.

A specimen of *P. angustus* measures 9 mm. long, 10.3 wide; ratio, 1 : 1.14.

A female of *P. depressus* is 7 x 9.4 mm.; ratio, 1 : 1.34. Another specimen measures 6.5 x 8.2 mm.; ratio, 1 : 1.26.

Distribution.—*P. sica* is found from the Gulf of Mexico and Florida Keys to Barbados and Grenada, in depths of from 60 to 117 fathoms. It was dredged by the 'Bache' on the west coast of Florida and at Sand Key; by the 'Blake' at stations 32, 36, 132, 149, 253, 293; by the 'Albatross' at stations 2403 and 2641.

P. angustus is known only from off Santa Cruz, 117 fathoms, station 32, 'Blake.'

P. depressus was taken by the 'Blake' off Santa Cruz, Dominica, and Barbados, in from 56 to 138 fathoms, at stations 132, 192 (type locality), 272, 292, and 293.

Palicus bahamensis Rathbun, new species.

This species, although possessing abdominal and sternal laminæ, as in *sica*, *depressus*, and *angustus*, resembles in the characters of the carapace *dentatus* and its allies. Carapace very rough, with coarse granulation. Front divided by a wide and deep V-shaped notch; each lobe thus formed is faintly emarginate. Two superior orbital lobes triangular and obtuse.

Lateral teeth two, subequal in length, acute, and directed outward and only slightly forward. Median suborbital lobe truncate. Lobe at angle of buccal cavity very large and produced far beyond the inner lobe of the inferior orbital margin. Crest above posterior margin sinuous, broken into seven irregular scallops.

Crests on the first two abdominal segments of the ♂ trilobate and subparallel in a dorsal view, that of the first the wider. Third segment with a lobe on each side of the middle, partially visible in a dorsal view. Crest on the fifth sternal segment or that between the bases of the third ambulatory legs about half as wide as the second abdominal segment; its posterior margin is sinuous.

Chelipeds unequal in the male; the right one rather small; manus bicristate above, outer surface granulate, lower margin convex. Pollex slightly deflexed; its length not equal to the width of the manus. Merus of first ambulatory terminating in a large blunt tooth; meri of the second and third armed on the anterior margin with 4 or 5 curving, spiniform teeth; terminal tooth large, subacute; posterior margin spinulous; upper surface with squamose granules. Lobes on the anterior margin of the carpal joints small but distinct. Dactyli slender, posterior margin concave.

Dimensions.—♂: Length, 4.8 mm.; width, 5.5; length of second ambulatory (approximate), 11.6; merus of same, 3.2; carpus, 2; propodus, 2.6; dactylus, 2.8.

Type.—A single male was taken by the 'Albatross' at station 2651, lat. 24° 2′ N., long. 77° 12′ 45″ W., 97 fathoms, east of Andros Island, Bahamas, in Tongue of Ocean. U. S. Nat. Mus., No. 11394.

VOL. XI, PP. 101-102 APRIL 26, 1897

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

TWO NEW MOLES FROM CALIFORNIA AND OREGON.

BY C. HART MERRIAM.

Among the abundant signs of Pocket Gophers (*Thomomys*) observed about our camp on the rim of Crater Lake, Oregon, in August, 1896, were a few ridges which my assistant, Mr. Vernon Bailey, felt convinced were the work of Moles. Assiduous trapping for a number of days, however, failed to bring to light any of these animals until finally, on August 18, a trap which on the previous day had caught a Pocket Gopher was found to contain the long-sought Mole. This animal, on comparison with specimens of *Scapanus californicus* from the Fort Klamath plain, at the south base of Crater Lake Mt., seems to be a distinct species. It is decidedly larger, and differs further in the characters mentioned below; but its affinities are with *californicus* and not with the large *S. townsendi*, its immediate neighbor on the west. The species is here named *Scapanus alpinus*, and is of special interest as being, so far as known, the only strictly mountain Mole in America. It will probably be found to range northward in the Cascade Mountains, and possibly southward in the Sierra Nevada. The type specimen was captured in the Hudsonian zone, at an altitude of about 7000 feet [= 2130 meters].

Another apparently new species was secured by my assistant, Mr. Clark P. Streator, but in a widely different region—the desert region east of the mountains, in the extreme northeastern corner of California. I have named it *Scapanus truei* in honor of Mr. F. W. True, in recognition of his recently published '*Revision of the American Moles.*'

The new forms may be known from the following descriptions:

Scapanus alpinus sp. nov.

Type from Crater Lake, Mt. Mazama, Oregon. Altitude about 2130 meters [7000 ft.]. No. 79967, ♂ ad., U. S. Nat. Mus., Biological Survey Coll. Collected Aug. 18, 1896, by Vernon Bailey. Original No. 5784.

General characters.—Similar to *Scapanus californicus*, but larger, with longer and heavier skull.

Color.—Everywhere uniform grayish plumbeous, much as in *californicus*, but without the brownish tinge; widely different from the blackish of *S. townsendi.*

Cranial and dental characters.—Skull similar to that of *californicus*, but much longer; molar teeth larger; last (6th) unicuspidate tooth, both upper and lower, peg-like, lacking the posterior blade or cusp of *californicus.**

Measurements.—Type specimen, measured in flesh: total length, 188; tail vertebræ, 38; hind foot, 24.5.† Skull: greatest length, 37; basal length, 32; palatal length, 16.75; greatest zygomatic breadth, 13.5; mastoid breadth, 17.

Scapanus truei sp. nov.

Type from Lake City, Modoc Co., Calif., No. 79290, ad., U. S. Nat. Mus., Biological Survey Coll. Collected June 15, 1896, by Clark P. Streator. Original No. 5289.

General characters.—Similar to *S. californicus*, but paler and more plumbeous in color, and with a distinct inner cusp on last upper premolar.

Color.—Everywhere almost clear plumbeous (No. 14, 'olive-gray,' of Ridgway's Nomenclature of Colors), with a faint darker wash on upper parts.

Cranial and dental characters.—Skull similar to that of *S. californicus*, but slightly smaller, with narrower palate and decidedly narrower and more slender rostrum. Last upper premolar with a strongly developed, trenchant inner cusp, not present in *californicus.*

Measurements.—Type specimen (sex unknown) measured in flesh: total length, 170; tail vertebræ, 34; hind foot, 21. Skull: greatest length, 34.5; basal length, 29; palatal length, 15; zygomatic breadth, 13; mastoid breadth, 16.25.

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* This may be the result of wear, as the specimen is old.

† Two specimens of *S. californicus* from Ft. Klamath have the tail 33 and the hind foot 20.5.

VOL. XI, PP. 103-104 APRIL 26, 1897

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

THREE NEW JUMPING MICE (*ZAPUS*) FROM THE NORTHWEST.

BY C. HART MERRIAM.

There seem to be two well marked groups of species among the American Jerboas or Jumping Mice—the small *Zapus hudsonius* and its immediate allies from the region east of the Rocky Mountains, but including the new form here described under the name *tenellus*, and the large *princeps* and *trinotatus* and their allies from the mountains of the west and the northwest coast. Three new forms are here described—one from Kamloops, in the interior of British Columbia, and two from southwestern Oregon. Of the latter, one inhabits the Cascade Range about Crater Lake, the other the Rogue River Valley.

Zapus tenellus sp. nov.

Type from Kamloops, British Columbia. No. 66932, ♀ ad., U. S. Nat. Mus., Biological Survey Coll. Collected August 25, 1894, by Clark P. Streator. Original No. 4196.

General characters.—Size small; ears rather large; coloration dark; hind feet very slender. Similar to *Z. hudsonius*, but less yellow and very much darker and tail longer.

Color.—Dorsal area not sharply defined, grizzled with yellowish; sides olive-yellowish, heavily lined with black hairs; nose, ears, and inner side of legs to heel dusky; tail sharply bicolor: dusky above and at tip all round, whitish below; fore and hind feet soiled whitish.

Cranial characters.—Skull similar in size and characters to *Z. hudsonius.*

Measurements.—Type specimen: total length, 216; tail vertebræ, 134; hind foot, 31. Average of four specimens from type locality: total length, 208; tail vertebræ, 128.5; hind foot, 31.

Zapus pacificus sp. nov.

Type from Prospect, Rogue River Valley, Oregon. No. 80445, ♂ yg. ad., U. S. Nat. Mus., Biological Survey Coll. Collected August 29, 1896, by Edward A. Preble. Original No. 1454.

General characters.—Size rather small; dorsal area strongly suffused with yellowish.

Color.—Dorsal area not strongly defined, but so strongly saturated with yellow that the yellow predominates over the black; sides buffy yellow, moderately lined with black hairs; inner side of legs only slightly darkened; tail sharply bicolor: grayish above, white beneath; fore and hind feet soiled white.

Cranial characters.—Contrasted with *Zapus montanus* the skull of *Z. pacificus* is smaller; the rostrum and nasals shorter; audital bullæ smaller; basioccipital *broader* between bullæ; interpterygoid fossa shorter; upper molar series more divaricating anteriorly.

Measurements.—Type specimen: total length, 225; tail vertebræ, 141; hind foot, 31.

Remarks.—A slightly younger specimen obtained by Mr. Preble at the type locality has the dorsal area even less distinct, the entire upper parts being ochraceous yellow. A still younger specimen in my private collection (No. 3708) from Point Reyes, California, has the upper parts almost uniform deep ochraceous yellow with only the faintest trace of the dorsal area.

Zapus trinotatus montanus subsp. nov.

Type from Crater Lake, Oregon. No. 79863, ♀ ad., U. S. Nat. Mus., Biological Survey Coll. Collected August 19, 1896, by Edward A. Preble. Original No. 1388.

General characters.—Size rather large; similar to *Z. trinotatus*, but somewhat smaller and duller (sides less 'orange'), with shorter ears and feet, and differing slightly in cranial characters.

Color.—Dorsal area sharply defined, grizzled dusky and yellowish; sides ochraceous, conspicuously lined with black hairs; inner side of legs to heel dusky; tail sharply bicolor: gray above, white beneath; fore and hind feet soiled white. Belly in young adults washed with yellow.

Cranial characters.—Skull similar to that of *Z. trinotatus*, but somewhat smaller; palate narrower; incisive foramina narrower posteriorly; angular process of mandible less strongly developed.

Measurements.—Type specimen: total length, 231; tail vertebræ, 137; hind foot, 31. Average of eight from type locality: total length, 230; tail vertebræ, 135.5; hind foot, 31.

VOL. XI, PP. 105-107 MAY 13, 1897

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

DESCRIPTION OF A NEW SPECIES OF *SPHÆROMA*.*

BY HARRIET RICHARDSON.

Mr. E. Ben Carter has sent to the U. S. National Museum a large number of individuals of an undescribed species of *Sphæroma*, found boring the piers on St. Johns River, at Palatka, Florida. Sections of the wood received at the same time had been reduced, during a period of eight years, from a diameter of 16 inches to one of 7½ inches. The whole surface of the wood was bored with holes averaging in size about 5 mm. in diameter and in an end section arranged in concentric rings between the rings of annual growth, showing the little animal's preference for the soft pine. Very strong mandibles, projecting beyond the labrum in a most conspicuous manner, provide a perfect equipment for this destructive work. Spence Bate describes a species of *Sphæroma* from the Indian Peninsula with similar habits, with which the present species is compared.

Sphæroma destructor sp. nov.

Head twice as broad as long, having a small median projection. Eyes lateral and posteriorly situated. The first pair of antennæ, with a flagellum containing eight articles, reach the posterior margin of the head; the second pair of antennæ extend to the post-lateral angle of the first thoracic segment; its flagellum is twelve jointed.

The first and fourth thoracic segments are of equal length and are one and a half times longer than the other thoracic segments. The epimeral parts are distinct from the segments, are quite broad, and terminate laterally in acute angles, which point downward. The seventh thoracic segment bears four tubercles situated in a transverse line.

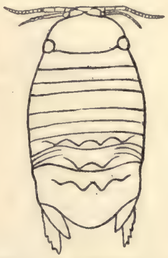

FIG. 3.—*Sphæroma destructor.* Dorsal view. × 3.

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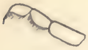

FIG. 4.—*Mandibular appendage.* × 10.

The abdomen is composed of two distinct segments, on the first of which, the post-abdomen, there are two tubercles, one on either side of the median line. Suture lines at the sides of this segment indicate three coalesced segments. The terminal segment is triangularly shaped and rounded posteriorly with an upcurved margin, which extends all around the terminal half of the segment. The whole surface of the abdomen is thickly tuberculated with low but distinct tubercles, each one surmounted with a small tuft of stiff hairs or bristles. On the anterior part four large tubercles are situated in a transverse line, the two center ones being somewhat closer to each other than to the lateral ones. The uropoda extend beyond the extremity of the abdomen, the outer branch being the longer. Both are pointed and similar in shape. The outer edge of the exopodite is provided with four teeth, while that of the endopodite is smooth.

The legs of this species are in three series, according to structure, the first three pairs being alike, the fourth and fifth similar, and the sixth and seventh similar. The legs of the first series are long and slender (fig. 5, *a*), with the second joint or basis nearly cylindrical in shape. The ischium is nearly as long as the basis, and this joint, as well as the merus, is furnished with long straight hairs. The carpus and propodus are likewise long and slender. The legs of the second series, the fourth and fifth pairs, are stout and short, being similar in general form, though differing somewhat in relative proportions. The basis is about half the length of the entire leg, while the joints following the ischium are very short. In the third series the legs are nearly as long as those of the first series, but differ in size and shape. They are stouter and not cylindrical.

The whole surface of the body is punctate, and has minute transverse rugæ between the points of depression. In color it is a dark brown, shaded on the edges with a lighter brown.

Type.—U. S. Nat. Mus., No. 19857.

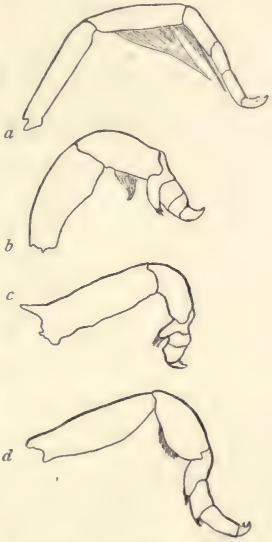

FIG. 5.—*Legs.* × 10.
a. Leg of 1st pair.
b. " 4th "
c. " 5th "
d. " 6th "

In the Ann. of Nat. Hist.* Spence Bate describes a new species of *Sphæroma*, *Sphæroma vastator*, which was procured "from a piece of wood which had formed part of a railway bridge over one of the backwaters of the West Coast of the Indian Peninsula." The wood is described as being "honeycombed with cylindrical holes, in many of which the animal was rolled up like a ball." Notwithstanding the close resemblance in habits and appearance of this species, as described and figured, to the present one, there are four points of difference:

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* (3) Vol. XVII, 1866, pp. 28–31, pl. ii, fig. 4.

I. *The number and arrangement of the tubercles in the two species.*—In *S. vastator* four tubercles are described on each of the last three segments of the thorax, and only two are figured on the anterior portion of the pleon. In the species under discussion, however, there are four tubercles on the seventh segment of the thorax only and six on the abdomen, two on the post-abdomen, and four on the anterior portion of the caudal shield.

II. *The structure of the feet.*—In *S. vastator* the legs of the first three pairs are not proportionately as long as those of the present species. The merus is differently shaped, not being cylindrical in that species, and is relatively shorter. Although Spence Bate mentions no dissimilarity in structure in the legs of the fourth and fifth pairs, still a difference is shown in the cut in the formation of the merus. With our species the difference in these two pairs of legs is merely in proportion. There is a greater resemblance in the sixth and seventh pairs of legs of the two species.

III. *The upcurved margin of the posterior half of the terminal segment of the abdomen.*

IV. *The presence of numerous tubercles furnished with bristle-like hairs upon the abdomen.*

Neither of these points are mentioned in the description of *Sphæroma vastator*.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

SYNOPSIS OF THE AMERICAN SPECIES OF *ETHUSA*, WITH DESCRIPTION OF A NEW SPECIES.*

BY MARY J. RATHBUN.

The type species of *Ethusa*, *E. mascarone* (Herbst) of the Mediterranean, is represented in the West Indian region by a form so slightly different that it cannot be regarded as more than a subspecies, *E. mascarone americana*. *E. microphthalma* is found in the deeper waters off the Atlantic coast of North America; *E. lata* and *E. ciliatifrons* occur on the Pacific coast of tropical America. To these a fifth species is now added, *E. tenuipes*, from the Gulf of Mexico and Florida Keys.

SYNOPSIS OF AMERICAN SPECIES OF *Ethusa*.

A. Eye-stalks long, extending laterally beyond the postorbital spine. *mascarone americana* A. Milne Edwards.
A′. Eye-stalks short, directed forward.
  B. Branchio-cardiac lines meeting in front of the heart. *ciliatifrons* Faxon.
  B′. Branchio-cardiac lines not meeting in front of the heart.
    C. Dactyli of second and third pairs of legs broad, vertically compressed.
      D. Third joint of antennæ reaching the extremity of the frontal teeth. *lata* Rathbun = *pubescens* Faxon.
      D.′ Third joint of antennæ not reaching the extremity of the frontal teeth. *microphthalma* Smith.
    C′. Dactyli of second and third pairs of legs slender, not vertically compressed. *tenuipes* Rathbun, new species.

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Ethusa tenuipes Rathbun, new species.

Closely allied to *E. microphthalma* Smith, but a much smaller species. The shape of the carapace and the outline of the front are similar to those of *microphthalma;* the cardiac region is more elevated and surrounded by a deeper groove. The eye-stalks are shorter than in *microphthalma*, the first segment of the antenna reaching the cornea.

The abdomen of the male is narrow; the penultimate segment is slightly narrower at its distal than its proximal end, and is shorter than its distal width. The appendages of the first segment have a lanceolate, foliaceous extremity, and sheathe the appendages of the second segment, which extend far beyond those of the first, and have slender, converging tips.

Chelipeds of the male very unequal, the right the larger. Right manus with upper and lower margins convex. Dactyli of first and second ambulatory legs more slender than in *microphthalma*, not vertically compressed, and having four carinæ, one above, one below, one anterior, and one posterior; dactyli a little wider in a dorsal than in a horizontal view.

Dimensions.—♂: length, 6 mm.; width, 5.5.

Type locality.—Off Key West, Florida, station 2316, steamer 'Albatross,' 50 fathoms (U. S. Nat. Mus., No. 19855).

Distribution.—Also dredged at station 2388 in the Gulf of Mexico, off the Delta of the Mississippi, 35 fathoms.

VOL. XI, PP. 111-112 MAY 13, 1897

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

DESCRIPTION OF A NEW SPECIES OF *CANCER* FROM LOWER CALIFORNIA, AND ADDITIONAL NOTE ON *SESARMA*.*

BY MARY J. RATHBUN.

In a collection of Crustacea from Lower California recently sent to the U. S. National Museum by Mr. A. W. Anthony, of San Diego, California, are two specimens of *Cancer* which cannot be referred to any known species.

Cancer anthonyi Rathbun, new species.

Resembles *C. antennarius* Stimpson. Carapace wider than in *antennarius*, and more convex, especially in the posterior half. Elevated portions of the gastric, branchial, and hepatic regions coarsely granulate. Front narrower than in *antennarius*. Median supraorbital tooth less prominent than in that species. Antennæ shorter.

Antero-lateral teeth nine, including the orbital; broader and less projecting than in *antennarius;* margins denticulate; second to eighth tooth, inclusive, having the posterior margins about twice as long as the anterior; first to sixth tooth, inclusive, obtuse; last three teeth with short, sharp tips, directed forward. Posterior margin with two faint emarginations; in *antennarius* this margin has a well marked tooth.

Suborbital margin with three teeth besides the postorbital; from the median tooth a sharp ridge extends obliquely backward and outward. Outer maxillipeds longer and narrower than in *antennarius;* merus oblong, anterior margins slightly oblique.

The dark color on the fingers extends the entire length of the prehensile margins and less than half the length of the outer margins; in *antennarius*, more than half the length of the outer margins.

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Carpal and propodal joints of the ambulatory legs almost naked. Dactyli with six longitudinal sulci, two superior, two inferior, one anterior and one posterior; in *antennarius* there are eight sulci, three superior, three inferior, one anterior, and one posterior.

Color, brownish red. Lower surface and legs much less hairy than in *antennarius.*

Dimensions.—♂: Length, 42.4; width, 65; exorbital width, 18.2 mm. ♀: Length, 35; width, 51; exorbital width, 15 mm.

Type locality.—Playa Maria Bay, west coast of Lower California; A. W. Anthony, collector; 1 ♂, 1 ♀ (U. S. Nat. Mus., No. 19856).

NOTE ON SESARMA.

Sesarma æquatorialis Ortmann, Zoöl. Jahrb., Syst., VII, Heft 5, 722, pl. xxiii, f. 14, 1894, Ecuador, should be added to the list of species of *Sesarma* on pages 89–91 of these Proceedings. As Heft 5 of vol. VII is not contained in the library of the Smithsonian Institution, I am unable to supply the characters of this species.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

REVISION OF THE AMERICAN VOLES OF THE GENUS *EVOTOMYS.*

BY VERNON BAILEY.

The following brief synopsis of the Red-backed Voles is based on a study of specimens in the collection of the U. S. Biological Survey and the private collections of Dr. C. Hart Merriam and Mr. G. S. Miller, Jr., supplemented by a series of the Arctic *Evotomys rutilus* from Alaska in the U. S. National Museum, which I have been permitted to examine through the courtesy of Mr. F. W. True. I am indebted to Mr. Outram Bangs for the privilege of including *Evotomys proteus*, an interesting new species from Labrador, of which he has kindly sent me his manuscript description and a series of specimens. In all, 650 specimens of *Evotomys* from 116 localities have been examined, and while it is still desirable to obtain material from many additional localities, especially specimens in different pelages from the same place, the present collections cover the ground fairly well.

The genus *Evotomys* is circumpolar, inhabiting the northern parts of Europe, Siberia, and North America. The only circumpolar species is the Arctic *E. rutilus*, which does not undergo any considerable change throughout the circumference of the Arctic Zone. None of the other species are common to both continents. The North American forms are boreal in range, covering almost the whole of Alaska, Canada, and the colder parts of the northern United States, and extending southward in the mountains to North Carolina and Colorado, and along the sea coasts to New Jersey and northern California. Excepting the southern Sierra Nevada in California and a few isolated mountains in various parts of the west, they fill the whole Boreal Zone of North America. In places where they range into a lower zone, local conditions are such as to induce a strong mixture of boreal species into the flora and fauna. This is most noticeable in the coast regions.

The material at hand shows the genus to be wonderfully uniform and the species closely interrelated. No widely divergent forms appear, and several of those now distinguished by names can be traced by every degree of intergradation to the forms from which they have become differentiated. Others in the process of separation have not gone far enough to warrant recognition by name. By mapping the distribution of the several species the more northern are seen to occupy much larger areas than the southern. Thus the Arctic *E. rutilus* is common to the polar parts of both continents, and the northern *E. gapperi* ranges from the Atlantic coast to the Rocky Mountains of British Columbia, while the more southern forms—as *carolinensis*, *galei*, and *californicus*—are restricted to limited areas. In commenting on these facts nearly ten years ago, Dr. Merriam says: "In high latitudes the climatic and general physiographic conditions are comparatively uniform, and boreal localities are not subject to the great and sometimes sudden changes with longitude that are so frequent in temperate and tropical regions. Hence it follows that the splitting up of specific types into subspecific forms from environmental agencies is much less common within the Arctic circle than farther south. Stated differently, boreal species are far more stable and persistent than those inhabiting warmer countries. In view of this fact, it is not surprising that the circumpolar *E. rutilus* presents but one phase throughout its entire range (specimens from Scandinavia, Siberia, and Arctic America being practically indistinguishable), while its more southern representatives have become variously modified."*

Generic characters.—The more important generic characters of *Evotomys* are cranial and dental, but color alone is sufficient for the recognition of the North American species, and also of the three European species—*rufocanus*, *glareolus*, and *rutilus*—that have come into my hands. Except the gray phase in two dichromatic species, all are characterized by a rufescent or reddish brown dorsal stripe which extends the whole length of the back.

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*MS notes on the genus *Evotomys*, written in 1888, and placed at my disposal by Dr. C. Hart Merriam.

The eyes are small, and the ears, except in a single species, *E. ungava*, are long enough to project above the fur. The feet are small. The tail is rather short, varying from 23 to 33 percent of the total length. The fur in winter is long and soft; in summer in most species it is short and harsh. Lateral glands, similar to those of the subgenus *Arvicola*, are usually present in adult males. They are situated on the flanks, one on each side, and average about 10 mm. in diameter. The hair covering these glands is doubly dense and usually differs in color and texture from that of surrounding parts, forming more or less conspicuous spots. The number of young produced at a birth varies from 4 to 6, but 4 is the more common number. There are 8 mammæ, arranged as follows: inguinal, $\frac{2}{2}$; pectoral, $\frac{2}{2}$.

The cranial characters of *Evotomys* are thus summed up by Mr. Gerrit S. Miller, Jr., in his recent paper on the genera of *Microtinæ*:* "The skull of *Evotomys*, . . . as compared with that of the other voles, is characterized by a general weakness and lack of angularity. All the outlines are full and rounded, and the ridges and furrows are slightly developed, even in extreme old age. The interorbital region is broader and the audital bullæ are larger and more inflated than usual in *Microtus* and *Phenacomys*. On the other hand, the zygomata are very slender and scarcely widened in the region of contact between the jugal and the zygomatic process of the maxillary. The mandible also is slender and weak. The bony palate terminates in a thin edged shelf continuous between the alveoli of the posterior incisors. . . . The structure is very different from that found in *Phenacomys* and in typical *Microtus*."

The teeth, while truly microtine in the arrangement of the prisms, differ from those of *Microtus* and resemble those of *Phenacomys* in having the molars always two-rooted in adults and the root of the lower incisor falling short of the dental foramen; they differ from those of *Phenacomys* in the approximately equal depth of outer and inner reëntrant angles in the lower molars.

Habits.—Little is known of the habits of the Arctic *E. rutilus*, but most, and probably all, of the species inhabiting the United States have very similar habits. They live in cool, moist woods and brush lands, and seem to delight in the deepest shade and the cover of fallen leaves, tangled weeds, and half-decayed logs. Their nests are built in underground burrows, under logs, or under cover of old leaves. A trap set under the edge of a half-rotten log in the woods is pretty sure to get a Red-back if a shrew does not happen along first. Though mainly nocturnal, they are sometimes seen in the daytime. A rustling in the dry leaves and a quick brown flash are the usual evidences of their presence, unless one has the patience to sit for hours in the woods watching for them. I have surprised them by suddenly turning over a log and tipping them rudely out of their nests; have caught them in my hands as they scampered from their feeding grounds to their burrows, and have watched them gliding about among their favorite food plants. Early one morning, when camped in the Big Snowy Mountains in Montana, I was watching the Pine Squirrels climb to the tallest spruce tops to warm themselves in the first rays of sunlight, when the leaves moved and out came an *Evotomys* only a few feet away. After eyeing me intently for a moment he began to move about as freely as if I had been a stump. His ears were erect and constantly changing position, his eyes were bright and prominent, and his nose and whiskers were in constant motion. His color harmonized beautifully with the reddish-brown leaves and the yellow and gray stems of dry grass as he scampered from one plant to another, reaching up to bite off the stems, and then hunching himself up in a fluffy, round ball to eat from his hands, while keeping one eye on me.

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*North American Fauna, No. 12, p. 43, July, 1896.

In winter these mice do not hibernate, nor have I ever found evidence of their storing provisions. They make long tunnels under the snow, through which they travel about with perfect security from a host of enemies, while they procure the tender grass blades and ripe seeds as easily from the surface of the ground as when the white blanket is not above them. All sorts of seeds and green vegetation are eaten, but grass is the favorite food, especially the half-blanched, tender base of the young grass blades.

Nineteen species and subspecies are here recognized as inhabiting Canada and the United States. Of these, five are described as new—one by Mr. Bangs and four by the writer.

LIST OF AMERICAN SPECIES AND SUBSPECIES OF EVOTOMYS, WITH TYPE LOCALITIES.

rutilus	Siberia, east of the Obi.
wrangeli	Wrangel Island, Alaska.
dawsoni	Finlayson River, Northwest Territory, Canada.

gapperi	Near Lake Simcoe, Ontario, Canada.
" *ochraceus*	Mount Washington, New Hampshire.
" *rhoadsi*	Mays Landing, New Jersey.
" *loringi*	Portland, North Dakota.
" *galei*	Ward, Colorado.
" *saturatus*	Nelson, British Columbia.
brevicaudus	Custer, Black Hills, South Dakota.
carolinensis	Roan Mountain, North Carolina.
ungava	Fort Chimo, Ungava.
idahoensis	Sawtooth Lake, Idaho.
mazama	Crater Lake, Oregon.
obscurus	Prospect, Oregon.
californicus	Eureka, California.
occidentalis	Aberdeen, Washington.
nivarius	Mount Ellinor, Olympic Mountains, Washington.
proteus	Hamilton Inlet, Labrador.

KEY TO SPECIES AND SUBSPECIES OF EVOTOMYS.

Ears distinctly rufous-tipped, not gray or dusky.

- Tail more than twice the length of hind foot.
  - Dorsal stripe not sharply defined.
    - Ears small, scarcely protruding from fur, dorsal area ill defined, dull chestnut................*ungava.*
    - Ears large, prominent above fur, dorsal area dark chestnut, blending with color of sides (winter pelage)..................................*carolinensis.*
  - Dorsal stripe sharply defined.
    - Tail scarcely more than twice the length of hind foot, about 27 per cent. of total length.
      - Dorsal stripe bright chestnut, with scattered black hairs, color sometimes dichromatic..*gapperi.*
      - Dorsal stripe dull rusty rufous without black hairs, color not dichromatic..............*ochraceus.*
    - Tail considerably more than twice the length of hind foot, about 30 per cent. of total length.
      - Large, hind foot 20 or more; colors dichromatic, a red and a gray pelage............*proteus.*
      - Smaller, hind foot less than 20; not dichromatic.
        - Skull with pronounced superciliary ridges in adults, size medium...............*galei.*
        - Skull without pronounced superciliary ridges in adults, slightly larger.....*saturatus.*
- Tail less than twice the length of hind foot.
  - Dorsal stripe sharply defined, tail bicolor.
    - Size large, foot 20 mm., dorsal stripe ferruginous.

Tail about 30 mm. long, thick, and densely bristly ....*rutilus.*
Tail about 33 mm. long, not very thick or densely bristly ....*dawsoni.*
Size small, hind foot 18–19 mm., dorsal stripe not ferruginous.
Smallest of the genus, foot 18, dorsal stripe dark, rich chestnut in summer.............*loringi.*
Slightly larger, foot 19, tail relatively shorter, dorsal stripe pale chestnut in summer ... *brevicaudus.*
Dorsal stripe not sharply defined, blending with color of sides.
Tail indistinctly bicolor, dorsal stripe dull brownish . ...*wranglei.*
Tail distinctly bicolor, dorsal stripe plain chestnut ....*rhoadsi.*
Ears gray or dusky, not distinctly rufous-tipped.
Posterior edge of palate straight, colors bright, tail bicolor.
Dorsal stripe not sharply defined (dark chestnut in summer pelage). ....*carolinensis.*
Dorsal stripe sharply defined (hazel or chestnut).
Sides clear, bright gray, skull long and narrow, hind foot 20...................... ....*idahoensis.*
Sides dark buffy gray, skull wide and angular, hind foot 18...............................*nivarius.*
Posterior edge of palate with a median projection, colors dark in all but *mazama.*
Colors dusky or blackish above.
Tail unicolor or nearly so, dusky or blackish, hind foot 18...................................*occidentalis.*
Tail bicolor, blackish above, whitish below, hind foot about 21.
Tail long, colors dark, skull thick and wide interorbitally..........................*californicus.*
Tail shorter, colors not so blackish, skull slender and narrower interorbitally.......*obscurus.*
Colors not dusky or blackish.
Dorsal area dull hazel, sides grayish, skull broad, angular, and flat-topped.....................*mazama.*

Evotomys rutilus (Pallas).

Mus rutilus Pallas, Nov. Sp. Quad. Glirium, 246, pl. xiv B, 1778.

Geographic distribution.—Arctic regions of America, Europe, and Siberia.

Type locality.—Siberia, east of the Obi.

General characters.—Rather large and bright colored; always recognizable by the short, thick, bristly tail and stout hind feet; fur long and soft; feet and ears densely haired.

Color.—Winter pelage: dorsal stripe well defined, extending from in front of ears to rump, rich rufous or ferruginous, slightly darkened with black tipped hairs; face, sides, and rump bright buffy ochraceous; belly heavily washed with buff or rich cream; feet white; ears rufous like back; tail sharply bicolor, buff or ochraceous buff below, above brownish at base, blackish along terminal portion. *Summer pelage:* dorsal stripe darker; sides less strongly buffy; belly soiled whitish; feet gray; tail less sharply bicolor.

Cranial characters.—Skull thick and strong, not much ridged or angulated; upper outline slightly arched, not concave interorbitally; brain case squarish; ascending arm of premaxilla terminating on a line with truncate end of nasals; audital bullæ moderately large and inflated, hiding ends of pterygoids in side profile; posterior edge of palate slightly notched; lateral bridges wanting, so that instead of a shelf the bone stands out as a tongue;* molars not peculiar; incisors stout, with orange colored enamel surface.

Measurements.—In the original description Pallas gives the following measurements: "Nose to anus, 3″ 7½‴ [= 98 mm.]; tail vertebræ, 1″ 1‴ [= 29 mm.]; pencil, 3‴ [= 7 mm.]; hind foot, 8⅛‴ [18 mm.]." Two specimens from Finmark and Sweden measure in the dry skin: tail, with vertebræ left in, 24; hind foot, 20. An alcoholic specimen from St. Michaels, Alaska: total length, 130; tail vertebræ, 30; hind foot, 20. *Skull* of adult (No. 6555, Merriam collection) from Finmark: basal length, 23.5; nasals, 7.8; zygomatic breadth, 14.3; mastoid breadth, 12; alveolar length of upper molar series, 5.

General remarks.—The above description is based on four specimens in the Merriam collection from Lapland and Finmark, which are assumed to be typical *rutilus.* The American form is similar in most details, but, as all of the available skins are in wretched condition and without reliable measurements, a satisfactory comparison is impossible.

The side glands do not show in any of the four European specimens, though one is marked ♂ and two are unmarked for sex. A faint trace of them may be seen in two of the specimens from St. Michaels, Alaska.

In the original description Pallas states that *Evotomys rutilus* inhabits the woods locally, but is also found in the cold Arctic regions as far north as the Gulf of Obi. In Arctic America it has been taken at various places on the Barren Grounds to as far north as Fort Anderson, as well as at the edge of timber. As yet too little is known of its range to safely attribute it to the Barren Grounds, where it probably belongs.

Specimens examined.—Total number, 27; 23 in U. S. Nat. Mus.; 4 from Europe, in Merriam collection.

Alaska: St. Michaels, 17; Kagiktowik, 2; Fort Yukon, 2.

Northwest Territory: Fort Anderson, 1; Fort Simpson, 1.

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* In Alaska specimens the lateral bridges are usually complete. This and other slight differences may separate the American from the Old World form of *rutilus* when series of good specimens of the two can be brought together.

Evotomys wrangeli sp. nov.

Type from Wrangel, Wrangel Island, Alaska. No. 74724, ♀ ad., U. S. Nat. Mus., Biological Survey Coll. Collected Sept. 1, 1895, by C. P. Streator. Collector's number, 4835.

Geographic distribution.—Known only from Wrangel and Revillagigedo Islands, southern Alaska.

General characters.—A large, dull-colored species entirely distinct from any known form. Tail short, rarely twice as long as hind foot; fur thick and long in both young and adults collected early in September; ears well clothed with short hairs, distinctly rufous tipped. Side glands well developed in one specimen of the series.

Color.—Dorsal area dull dark chestnut with a liver brown tone, covering whole back from eyes to base of tail, including ears, and shading gradually into the sepia gray of sides and cheeks; sides more or less suffused with buffy yellowish; belly dark plumbeous, washed with whitish or buffy-ochraceous; projecting part of ear and tuft of long hairs in front of ear color of back; no postauricular spot; feet dusky gray in adults, sooty in young; tail bicolor, soiled buffy below, blackish above, darker and less distinctly bicolor in immature specimens. In one adult ♂, No. 74728, the white hairs covering the side glands form oval patches half an inch in length.

Cranial characters.—Skull long and narrow, not thick or angular; rostrum long and decurved; zygomata smoothly arched; nasals usually notched, rarely truncate posteriorally, terminating on a line with premaxillæ; frontals slightly concave posteriorally; audital bullæ of medium size; palatine bones short, anterior end rounded, posterior edge straight; lateral bridges complete before maturity; incisors large, molar series long.

Measurements.—Average of 4 adults (2 ♂ and 2 ♀) from Wrangel: total length, 147; tail vertebræ, 37; hind foot, 20. *Skull* of type: basal length, 24.3; nasals, 8; zygomatic breadth, 13.5; mastoid breadth, 11; alveolar length of upper molar series, 5.5.

Remarks.—The above description is based on 18 specimens from Wrangel, taken from September 1 to 12. The series includes specimens of every size, from quarter-grown young to old adults, and shows very uniform coloration, except the usual brightening with age and variation in color of belly. Four specimens in worn summer pelage have the dorsal area brighter chestnut and the sides decidedly more yellowish than in the rest of the series. All of the specimens from Loring have the bellies strongly washed with buffy-ochraceous, while more than half of those from Wrangel have whitish bellies.

In no way does *E. wrangeli* show a close relationship to any other American species. In size and relative proportions it comes closest to *E. dawsoni*, from which it differs widely in coloration and more widely in cranial characters. With the long-tailed species south and east of its range there is no need of comparison.

Specimens examined.—Total number, 35, from two islands on the coast of *Alaska:* Wrangel, 18; Loring, 17.

Evotomys dawsoni Merriam.

Evotomys dawsoni Merriam, American Naturalist, XXII, 649, July, 1888.

Type locality.—Finlayson River (a northern source of Liard River, NWT., lat. 61° 30′ N., long. 129° 30′ W., altitude 3000 feet [915 meters]).

Geographic distribution.—From Finlayson River and Fort Liard west to Yakutat and Juneau, and north along the coast to Prince William Sound.

General characters.—Robust, with large body and short tail; tail rarely twice as long as hind foot, well haired, but not bristly as in *rutilus;* ears prominent and well haired; colors bright.

Color.—Dorsal stripe sharply defined, reaching from just back of eyes to base of tail, bright ferruginous with few dark hairs; sides, face, and rump buffy-ochraceous; belly thinly washed with pale buff; tail distinctly bicolor, clear buffy-ochraceous below, a mixture of rufous and blackish hairs above; feet thinly clothed with buffy and dusky hairs; ears covered on inner surface of projecting tips with short, rufous hairs; an indistinct yellowish postauricular spot; eyes encircled by faint yellowish rings; tufts of rufous hairs fall back from in front and fill openings of ears; a small white throat patch marks 10 out of 29 specimens; spot covering side glands inconspicuous.

Cranial characters.—Skull large and thick-walled, relatively short, wide, and angular, with the smallest and flattest audital bullæ of any American species; nasals terminating on a line with ascending arm of premaxillæ, pointed in immature, rounded in adult skulls, never truncate; pterygoids strong and prominent, the ends showing in lateral profile above the small, flattened bullæ; basioccipital unusually wide between bullæ; palatines short, rectangular, with lateral bridges incomplete except in skulls of old individuals; posterior margin of palate with a central notch, deepest in immature specimens; incisors large, with dark orange enamel; molar series long and narrow.

Measurements.—Average of 8 adults from Yakutat (4 ♂ and 4 ♀): total length, 144; tail vertebræ, 33; hind foot, 20. *Skull*, No. 73566, adult ♂, basal length, 22.5; nasals, 7.5; zygomatic breadth, 14; mastoid breadth, 12.2; alveolar length of upper molar series, 5.

Remarks.—The type was collected June 23, 1887, by Dr. George M. Dawson, Director of the Geological and Natural History Survey of Canada. Through the kindness of Dr. Dawson it is now before me for comparison with a large series of skins and skulls from Yakutat and Juneau, Alaska. It is gratifying to find that the type agrees in every particular with this series of specimens, and that the name *Evotomys dawsoni* stands for this large and handsome species. The type was not fully adult, and unfortunately was mounted from a half relaxed skin, so that the size is greatly reduced. The tail vertebræ were not removed, and the tail has dried short, but the hind foot and ear give reliable measurements for comparison. The skull is badly broken, but the teeth give good characters for comparison. The openly communicating loops and the length of the molar series as a whole may be perfectly matched in slightly immature skulls from Yakutat.

The combination of large size and short tail, notched palate and small audital bullæ, while distinctly separating the species from all others south of its range in America, brings it in closer relationship with *E. rutilus.* From *rutilus*, however, it differs in longer, slenderer, less hairy tail, slenderer feet, duller color, with less rufous on ears, and the following important cranial characters: skull less massive; rostrum longer and slenderer; audital bullæ smaller; pterygoids more prominent; nasals sharp tipped or rounded posteriorly instead of truncate; molar series much narrower and slenderer. In external characters it slightly resembles *E. rufocanus** of northern Europe, but differs widely from that species in cranial characters.

Specimens examined.—Total number 38, from 5 localities.

Northwest Territory: Finlayson River, 1, the type.

British Columbia: Fort Liard, 2.

Alaska: Yakutat, 29; Juneau, 3; Prince William Sound, 3.

Evotomys gapperi (Vigors).

Arvicola gapperi Vigors, Zoöl. Jour., vol. V, p. 204, pl. ix, 1830.
Evotomys fuscodorsalis Allen, Bull. Am. Mus. Nat. Hist., vol. VI, p. 103, 1894.

Type locality.—Vicinity of Lake Simcoe, Ontario, Canada.

Geographic distribution.—From Massachusetts, New Jersey, and Pennsylvania northward and from the Atlantic coast westward to the Rocky Mountains in Canada.

General characters.—Small, slender, and bright colored, with slender feet and a medium length tail. Of the American species it most nearly resembles *E. glareolus* of Europe.†

Color.—*Winter pelage:* dorsal stripe from just back of eyes to base of tail, bright chestnut, with numerous black hairs and a slight frosted tinge from subterminal white portion of part of the rufous-tipped hairs; sides bright buffy-ochraceous; belly washed with pale buff; feet silvery gray; tail bicolor, grayish buff to the tip below, brownish above, with upper part of pencil black. In high pelage a rufous stripe extends through eye to black spot at base of mustache. *Summer pelage:* darker all over, with more dusky on feet and tail. *Young:* when half grown, similar to adults, but with thinner surface colors, through which the slaty under fur shows.

**Evotomys rufocanus* (Sundevall) of northern Europe is remarkable for its large molars and almost microtine form of skull. It is the most divergent form of the genus known, with dorsal stripe yellowish rufous; sides, face, and rump clear gray; tail short; hind feet large.

Measurement of a dry skin from Lapland (No. $\frac{3764}{6556}$, ♂, Merriam collection): total length, 138; tail vertebræ, 33; hind foot, 20. *Skull:* basal length, 25; nasals, 7.6; zygomatic breadth, 15; mastoid breadth, 12.2; alveolar length of upper molar series, 6.7.

† *Evotomys gapperi* differs from *E. glareolus* of Oxfordshire, England, in better defined dorsal stripe and less extensive rufous on ears and face, slightly lighter coloration, and relatively shorter tail. I fail to discover tangible cranial differences.

Cranial characters.—Skull small and slender, not ridged or angular, except in very old individuals; audital bullæ small, full, and rounded, less angular, elongated, and appressed than in *carolinensis;* palate straight edged, or rarely with a slight central projection; molar row slender.

Measurements.—Average of 4 adults assumed to be typical from Locust Grove, N. Y., measured by Dr. C. Hart Merriam: total length, 141; tail vertebræ, 37; hind foot, 18.1. Average of 10 adults from Elizabethtown, N. Y., measured by Gerrit S. Miller, Jr.: total length, 141; tail vertebræ, 39; hind foot, 18.3. Average of 10 adults from Peterboro, N. Y.: 145; 40; 18.3. *Skull* from Emsdale, Ontario, Canada, old ♂, No. 75896: basal length, 21.6; nasals, 6.5; zygomatic breadth, 13.3; mastoid breadth, 11.2; length of upper molar series, 5.

Remarks.—Evotomys gapperi, with the possible exception of *E. rutilus*, occupies the largest area of any species in America, and, as might be expected, presents considerable variation in the extremes of its range. Some of the peripheral forms have become sufficiently marked to be worthy of recognition by name, while others are barely distinguishable from the central form. A decrease in size takes place in the prairie country of Minnesota and the Dakotas; an increase beyond the normal in the northern Rocky Mountains. North and east of the type locality another increase is noticeable, especially in the feet. Specimens from Godbout, Quebec, are larger even than *ochraceous*, though in color they appear to be darker instead of lighter than *gapperi;* but they have been preserved in wood alcohol, which has doubtless changed the color.

Another peculiarity of the northeastern animal as it enters the Hudsonian zone is a tendency to dichromatism. Dr. Allen first made known the abnormal phase from Trousers Lake, New Brunswick, but supposing it characterized a new species gave it the name *fuscodorsalis.*[*] Normal, and what were considered typical, *gapperi* were secured at the same place and at the same time as the others. During the past summer Mr. Gerrit S. Miller, Jr., collected series of specimens in both the gray and the red pelages at Nepigon and Peninsula on the extreme north shore of Lake Superior, which he has kindly placed at my disposal. In a critical comparison of measurements, skulls, and external characters of the two forms I find no difference other than color, and am compelled to agree with the previous conclusions of Mr. Miller[†] that the gray animal represents only a color phase.

The gray form is characterized by the entire absence of a rufous dorsal stripe, in place of which there is usually a sooty or black stripe; by clear gray sides and light gray wash of belly, and in very dark specimens by clear black upper surface of tail.

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[*] Bull. Am. Mus. Nat. Hist., vol. VI, 103, 1894.

[†] Notes on the Mammals of Ontario, by Gerrit S. Miller, Jr. Proc. Bost. Soc. Nat. Hist., vol. 28, p. 16, April, 1897.

Specimens examined:

Massachusetts: Wilmington, 5.
Pennsylvania: Renovo, 5.
New Hampshire: Ossipee, 17.
New York: Lake George, 13; Locust Grove, 5.
Minnesota: Two Harbors, 18; Tower, 5.
Ontario: Emsdale, 1; Peninsula, 5; Nepigon, 4.
Quebec: Godbout, 10.
Manitoba: Rat Portage, 1.
Assiniboia: Indian Head, 5.
Saskatchewan: Wingard, 7; Carlton, 1.
Alberta: South Edmonton, 25; St. Albert, 2; Muskeg Creek (lat. 54°, long. 119°), 11; fifteen miles west of Henry House, 1, im.; fifteen miles south of Henry House, 1; Canmore, 1; Banff, 4.
British Columbia: Field, 1, im.

Evotomys gapperi ochraceus Miller.

Evotomys gapperi ochraceus Miller, Proc. Bost. Soc. Nat. Hist., vol. XXVI, p. 193, March 24, 1894.

Type locality.—Mount Washington, New Hampshire (Alpine Garden, at 5400 feet altitude).

Geographic distribution.—The White Mountains of New Hampshire and (probably eastward to) Nova Scotia.

General characters.—Similar to *E. gapperi*, but slightly larger and much duller and paler; fur long and lax; skull as in *gapperi*.

Color.—Type specimen: dorsal area faintly outlined, pale dull rusty rufous, with no black hairs; sides buffy clay color; belly plumbeous, lightly washed with dirty whitish; feet gray; tail bicolor, buffy below, brownish above; upper part of pencil blackish; ears well haired, upper edges pale fulvous.

Cranial characters.—Skull of type not appreciably different from that of typical *gapperi*.

Measurements.—Type, measured in flesh by Gerrit S. Miller, Jr.: total length, 148; tail vertebræ, 39.6; hind foot, 19. *Skull* of type: basal length, 22; nasals, 6.7; zygomatic breadth, 13; mastoid breadth, 11.3; upper molar series, 5.

General remarks.—This subspecies differs from typical *gapperi* in paler, duller coloration—the opposite extreme from the dark, rich *carolinensis* which inhabits the tops of the mountains of North Carolina. Specimens from Ossipee, N. H., are evidently intermediate between *gapperi* and *ochraceus*. In size they even exceed *ochraceus*, and in color they are slightly paler than true *gapperi*. Specimens from Digby and James River, Nova Scotia, kindly placed at my disposal by Mr. Outram Bangs, are plainly referable to *ochraceus*, though with a slightly darker, brighter dorsal stripe than the type.

Evotomys gapperi rhoadsi Stone.

Evotomys gapperii rhoadsii Stone, Am. Nat., vol. XXVII, p. 54, Jan., 1893.

Type locality.—Mays Landing, New Jersey.

General characters.—Similar to typical *gapperi* but with slightly darker dorsal stripe, less buffy sides, slightly shorter tail, and larger hind foot. The body measurements, as well as the skulls, show the animal to be identical in size with *gapperi*, the difference in dimensions appearing only in length of tail and foot.

Color.—Dorsal area, extending from between eyes to base of tail, plain chestnut; sides buffy gray; belly washed with buff or whitish; tail, feet, and ears as in *gapperi*.

Measurements.—Average of 3 young adults from type locality, measured in the flesh by J. Alden Loring: total length, 139.3; tail vertebræ, 36; hind foot, 20. *Skull* (adult ♂, No. 76679): basal length, 21.5; nasals, 7; zygomatic breadth, 13.5; mastoid breadth, 11.3; alveolar length of upper molar series, 5.2.

General remarks.—Three adult topotypes collected by J. Alden Loring at Mays Landing, New Jersey, February 29 and March 1, agree in part with the original description of the subspecies. The slight shortness of the tail compared with that of typical *gapperi* is entirely within the range of individual variation and discrepancies in methods of taking measurements. If a more extensive series of specimens should prove the color and foot characters inconstant, the subspecies will have to be given up. With the material in hand I prefer to retain it, though other more marked forms remain unnamed. The nearest localities to Mays Landing, N. J., from which I have examined specimens of *Evotomys* are Wilmington, Mass., and near Renovo, Penn. These specimens are fairly typical *gapperi* with no tendency toward *rhoadsi*, and Mr. Rhoads has recorded *gapperi* from northern New Jersey and from Monroe and Pike counties, in northeastern Pennsylvania.

Evotomys gapperi loringi,* subsp. nov.

Type from Portland, North Dakota, No. 75795, ♂ ad., U. S. Nat. Mus., Biological Survey Coll. Collected Nov. 22, 1895, by J. Alden Loring. Collector's number, 3438.

Geographic distribution.—Timbered valleys along edge of plains in Minnesota and eastern North and South Dakota.

General characters.—Smallest *Evotomys* known in America, with bright coloration and narrow, slender skull.

Color.—*Full winter pelage:* dorsal stripe sharply defined, extending from anterior base of ears back between ears to rump, pale reddish hazel, scarcely darkened with black hairs and frosted from the presence of a white subterminal zone. In some specimens with the maximum of white the back is fairly hoary, in others the chestnut predominates and conceals the white zone. Face, sides, and rump, bright grayish ash, more or less washed with buffy; belly pure white or rarely creamy white; ears pale chestnut; feet pure white; tail sharply bicolor, whitish below, blackish brown above; pencil black above, a few white hairs below. Adult males with large whitish or light grayish spots over the side glands. *Summer pelage:* dorsal stripe dark, rich chestnut; sides and face pale bister, more or less suffused with yellowish; belly thinly washed with white or whitish; feet dusky; tail darker and less sharply bicolor; ears brownish; side spots in old males sooty gray. Young slightly darker than adults.

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* Named for the collector of the type series, Mr. J. Alden Loring.

Cranial characters.—Skull, compared with that of *gapperi*, smaller and relatively narrower and slenderer; even in old age not ridged or angular; audital bullæ less rounded and inflated than in *gapperi;* posterior edge of palate straight or slightly projecting on median line.

Measurements.—Average of 18 adults from type locality, measured in the flesh by J. Alden Loring: total length, 123; tail vertebræ, 31.5; hind foot, 17.9; tail, 25.5 per cent. of total length. *Skull* of type: basal length, 21.5; nasals, 6.8; zygomatic breadth, 12.8; mastoid breadth, 10.9; length of upper molar series, 5.

General remarks.—There is no climatic or topographic barrier to prevent *Evotomys* from ranging continuously from the type locality of *gapperi* to all of the points from which *loringi* is known. Good series of specimens from a chain of intermediate localities show direct connection, and prove that the form to which the name *loringi* is applied has developed as it reached out on the dryer, more open region along the edge of the prairies. The extremes of the form come from the farthest outlying localities. Specimens from the north shore of Lake Superior and thence westerly as far as Tower, Minnesota, are fairly typical *gapperi.* Those from Hinckley and Bridgman, near the middle of the State, are nearer *loringi*, while Minneapolis and Elk River specimens are almost typical. Specimens from Browns Valley, Minnesota, Fort Sisseton, South Dakota, and Portland, North Dakota, are typical. Two from Pembina, North Dakota, are doubtful, and one from Carberry, Manitoba, is clearly intermediate.

Specimens examined.—Total number, 56, from 10 localities (24 in the Merriam collection, 32 in the Biological Survey collection):

North Dakota: Portland, 18; Pembina, 2.
South Dakota: Fort Sisseton, 2; Travere, 2.
Minnesota: Browns Valley, 5; Elk River, 5; Minneapolis, 7; Hinckley, 10; Bridgman, 4.
Manitoba: Carberry, 1.

Evotomys gapperi galei Merriam.

Evotomys galei Merriam, North American Fauna, No. 4, p. 23, pl. ii, figure 3, October 8, 1890.

Type locality.—Ward,* Boulder County, Colorado. Altitude 9500 feet (2900 meters).

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*The type locality was given in the original description as Gold Hill, It has since been learned that the type specimen came from Ward, about 6 miles above Gold Hill.

Geographic distribution.—Boreal zone of mountains of Colorado and northward along eastern ranges of Rocky Mountains to northern Montana.

General characters.—Similar to *E. gapperi*, with slightly longer tail and lighter coloration, skull developing prominent superciliary ridges with age.

Color.—*Winter pelage:* dorsal stripe sharply defined, reddish chestnut, with a few black hairs; sides and face buffy gray; belly and feet whitish or yellowish gray; tail bicolor, whitish below, blackish or buffy gray above, except the black upper part of pencil; ears faintly tinged with color of back. In spring and early summer pelage the dorsal stripe darkens to warm hazel and the sides to rich buffy gray. *Full summer pelage:* dorsal stripe chestnut, slightly darkened with black hairs; sides and face clearer gray than in winter; feet gray. *Young*, in August: darker than the adults, with ears strongly tipped with chestnut; feet dusky and tail not sharply bicolor; spots covering side glands in old males whitish or gray.

Cranial characters.—Skull of adult narrower than that of *gapperi*, sharply concave interorbitally, with prominent superciliary ridges; zygomatic arches not abruptly spreading; audital bullæ small and globose; palate straight-edged or rarely with a slight central projection.

Measurements.—Average of 6 adults from Longs Peak, measured in the flesh by Edward A. Preble: total length, 145; tail vertebræ, 43.6; hind foot, 18.2; tail, 30 per cent. of total length. One adult ♂ topotype, No. 74076: 146; 40; 18. *Skull* of adult topotype, No. 74076: basal length, 22.2; nasals, 6.5; zygomatic breadth, 13; mastoid breadth, 11; alveolar length of upper molar series, 5.

General remarks.—Apparently *galei* branches off from *gapperi* along the east base of the Canadian Rockies and extends southward in a frequently interrupted line, following the eastern ranges of the Rocky Mountains to Colorado. Specimens from St. Marys Lake, Summit, and Java, in northwestern Montana, except for slightly smaller size, are identical with *galei*. Specimens from Silverton and Crystal Lake, Colorado, are not typical, but the difference is not uniform and may be in part due to age and season. A badly mutilated skin in the National Museum from the Uinta Mountains, Wyoming, ought on geographic grounds to belong to this species. Four not fully adult specimens from the Bighorn Mountains, Wyoming, agree better with *galei* than with any other species. A good series from the Big Snowy Mountains, Montana, does not agree with *gapperi*, *galei*, or *saturatus*, but, as the degree of difference is too slight to warrant a new name, they are referred to *galei*.

Specimens examined.—Total number, 81, from 12 localities:

Colorado: Ward, 8; Gold Hill, 2; Longs Peak, 6; Silverton, 8; Crystal Lake, 1.

Wyoming: Bighorn Mountains, 4.

Montana: St. Marys Lake, 15; Java, 2; Summit, 4; Big Snowy Mountains, 25; Red Lodge, 2; Beartooth Mountains, 4.

Evotomys gapperi saturatus Rhoads.

*Evotomys gapperi saturatus** Rhoads, Proc. Acad. Nat. Sci., Phila., p. 284, October, 1894.

Type locality.—Nelson, B. C., on the Kootenay River, 30 miles north of the Washington line.

Geographic distribution.—The Blue Mountains of Oregon, mountains of northern Idaho, and northward into British Columbia to Cariboo Lake.

General characters.—Larger and longer tailed than *E. gapperi*, with larger ears and stouter hind feet; spot covering side glands conspicuous in all of the 11 adult males.

Color.—Dorsal stripe bright and rather light reddish chestnut, closely matching that of *E. gapperi* in specimens from Emsdale, Ontario, and western New York, except that it begins farther behind the eyes; sides, face, and lower rump dark gray, with less ochraceous wash than in *gapperi;* belly washed with almost pure white. Sixteen out of the twenty-four specimens from Nelson have a pure white throat patch extending from lower lip nearly to breast. Ears large, protruding well out of fur, slightly rufous-tipped; feet gray; tail indistinctly bicolor, light gray below, dark gray above.

Cranial characters.—Skull, compared with that of *gapperi*, larger, wider, and more angular; pterygoids longer and slenderer; audital bullæ slightly larger; premaxillæ projecting slightly back of truncate posterior end of the nasals; palatine bones U-shaped, with straight posterior margin; front of upper incisors pale lemon yellow.

Measurements.—Average of 15 adults measured in the flesh by collector: total length, 149; tail vertebræ, 45; hind foot, 18.2. *Skull* of an average sized adult, No. 66606: basal length, 22.3; nasals, 6.5; zygomatic breadth, 13.5; mastoid breadth, 11.2; aveolar length of upper molar series, 5.

General remarks.—Mr. S. N. Rhoads described this subspecies from a single specimen caught August 17, 1892, near the town of Nelson. The animal inhabits a large area of country, and, since the original description gives none of the important characters that distinguish it from neighboring species, the above description has been drawn up from a series of 24 good specimens collected by J. Alden Loring, August 20–28, at Silver King mine, six miles south of Nelson. I have not seen the type of *saturatus*, but assume the present series to be typical.

The species is distinguished from *E. mazama* by a darker dorsal area, shorter tail, more arched skull, straight posterior edge of palate, slenderer, less prominent pterygoids, smaller audital bullæ, and paler incisors. In external characters it resembles *E. idahoensis*, from which it differs in the broad, angular skull, narrower interpterygoid fossa, and in minor details. With the dark-colored *E. occidentalis* it needs no comparison.

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*The name *saturatus*, in suggesting a dark-colored animal, is misleading. The species is scarcely darker than *gapperi* and much lighter colored than *obscurus*, *californicus*, *occidentalis*, *wrangeli*, *dawsoni*, or *carolinensis*.

Specimens examined.—Total number, 71, from 14 localities.

British Columbia: Nelson, 24; Sicamous, 1; Glacier, 1.

Washington: Colville, 1.

Idaho: Mission, 1; Kingston, 1; Mullan, 6; Craig Mountains, 4.

Montana: Thompson Pass, 5; Prospect Creek, 3.

Oregon: Blue Mountains (10 miles north of Harney), 8; Strawberry Butte, 3; Elgin, 8; Kamela, 5.

Evotomys brevicaudus Merriam.

Evotomys gapperi brevicaudus Merriam, North American Fauna, No. 5, p. 119, pl. iii, figs. 7 and 8, July 30, 1891.

Type locality.—Custer, Black Hills, South Dakota. Exact locality, 3 miles north of the town; altitude about 6000 feet [1830 meters].

Geographic distribution.—Boreal cap of Black Hills in South Dakota.

General characters.—As large as *E. gapperi*, with rather larger hind foot and much shorter tail; coloration in summer pelage paler. Larger than *E. loringi*, with relatively shorter tail.

Color.—*Summer pelage:* Similar to *loringi*, but paler, with black hairs more conspicuous; sides ash gray, strongly suffused with buffy; belly creamy white; side spots dusky gray. In the type and topotype the tail, feet, and ears are discolored by corrosive sublimate.

Cranial characters.—Skull similar to that of *gapperi* in large size and broad brain case; zygomatic arches low and flaring out, so that the inner instead of the outer side shows in a top view; audital bullæ as large as in *gapperi*, but less rounded; pterygoids wide, flat, and close together; molars large; incisors slender and pale yellow, palate approximately straight-edged.

Measurements.—Type specimen measured in flesh by Vernon Bailey: total length, 125; tail vertebræ, 31; hind foot, 19. A topotype (No. 4506) measures 130; 32; 19. *Skull* of type: basal length, 21.2; nasals, 6.6; zygomatic breadth, 12.5; mastoid breadth, 11.3; alveolar length of upper molar series, 5.4. Skull of more fully adult topotype: basal length, 21.8; nasals, 7; zygomatic breadth, 12.8; mastoid width, 11; alveolar length of molar series, 5.3.

General remarks.—The two original specimens, collected July 18 and 21, 1888, show only the perfect summer pelage. The skulls show that the animals were not fully adult, though probably full grown. Though based on so scanty material, the characters distinguishing the species are fairly pronounced. Its range is isolated, and widely separated from that of any other members of the genus by open prairie country and a wide belt of the Transition zone. There seems to be no valid reason for considering it a subspecies. It is even difficult to decide to which form it is most nearly related.

Specimens examined.—Total number, 3, from two localities in the Black Hills.

South Dakota: Custer, 2; Deadwood, 1.

Evotomys carolinensis Merriam.

Evotomys carolinensis Merriam, Am. Jour. Sci., vol. XXXVI, p. 460, Dec., 1888.

Type locality.—Roan Mountain, North Carolina; altitude 6000 feet [1830 meters].

Geographic distribution.—Boreal parts of Alleghany Mountains of North Carolina, Tennessee, and West Virginia.

General characters.—Size large; hind foot, 20 mm. or more; tail long; color dark and rich; molars larger than in any other American species.*

Color.—Full summer pelage: back dark chestnut, blending gradually with bistre of sides, face, and rump; darkened everywhere above with numerous black hairs; belly varying from white to buffy-ochraceous, the under fur showing through; fur covering side glands of male forming an inconspicuous spot slightly darker than surrounding fur; ears dusky; feet grayish brown; tail indistinctly bicolor, gray below, blackish above, and all round at tip. *Winter pelage* (February, March, and April specimens): paler and brighter; back brighter ferruginous, belly averaging whiter; sides buffy-ochraceous instead of bistre; ears slightly rufous tipped. *Young* darker than adults.

Cranial characters.—Skull, compared with that of *E. gapperi*, larger, wider, and more angular, with audital bullæ relatively smaller, flatter, and more elongated; basioccipital wider between bullæ; molars larger and especially wider and heavier; enamel surface of upper incisors darker yellow.

Measurements.—Average of 4 adults (2 ♂ and 2 ♀) from type locality, measured in flesh by Dr. C. Hart Merriam: total length, 149; tail vertebræ, 44; hind foot, 20.2. *Skull* (a fully adult ♀, No. 73115): basal length, 23.5; nasals, 7.5; zygomatic breadth, 14.4; mastoid breadth, 12; alveolar length of upper molar series, 6.

General remarks.—*Evotomys carolinensis* is readily distinguished from all other eastern forms by its larger size and darker coloration. Specimens in the same pelage should be used for comparison, as the lightest phase of winter pelage in *carolinensis* matches the darkest summer phase of *gapperi*.

Specimens examined.—Total number, 87, from 3 localities.

North Carolina: Roan Mountain, 47; Highlands, 2.

West Virginia: Travellers Repose, Pocahontas County, 38.

Evotomys ungava sp. nov.

Type from Fort Chimo, Ungava. No. $\frac{5471}{6158}$, ♂ ad., Merriam Coll. Collected by L. M. Turner, May 12, 1883. Original number, 317.

General characters.—Size about as in *gapperi;* tail and feet slender; ears very small, not projecting beyond fur; colors dull; tail bicolor; skull slender; rostrum not decurved.

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* Only exceeded in size by the molars of *E. rufocanus* of Europe.

Color [type specimen skinned out of alcohol].—Dorsal area not sharply defined, dull brownish chestnut; sides and face buffy gray, finely lined with blackish hairs; belly dark plumbeous, heavily washed with buffy; ears tipped with color of back; feet dusky gray; tail indistinctly bicolor, soiled buffy below, brownish above; sides of nose whitish; a small white spot under lower lip.

Cranial characters.—Skull, compared with that of *gapperi*, long and slender; brain case narrower; zygomata less spreading; rostrum longer and straighter; audital bullæ longer, flatter, and less rounded; both upper and lower incisors slenderer; lateral bridges of palate incomplete; molars as in *gapperi*, except the first upper, in which the edges of the first and second inner salient loops meet and coalesce, inclosing a dentine core.

Measurements.—Type specimen, measured from alcohol by Dr. C. Hart Merriam: total length, 134; tail vertebræ, 39; hind foot, 19. *Skull:* basal length, 22.8; nasals, 7; zygomatic breadth, 13.5; mastoid breadth, 11; alveolar length of upper molar series, 5.

General remarks.—The type and only specimen was skinned and made up from alcohol, and doubtless the colors have changed somewhat; but the small ears, slender feet and tail, and distinctive cranial characters mark the species as entirely distinct from any other known form. In geographic position it comes nearest to *E. proteus* Bangs, of Hamilton Inlet, Labrador, but in characters differs more widely from that species than from the more distant *gapperi.*

In a letter to Dr. Merriam, Mr. Turner reported the species as abundant at Fort Chimo.

Evotomys idahoensis Merriam.

Evotomys idahoensis Merriam, North American Fauna No. 5, p. 66, July 30, 1891.

Type locality.—Sawtooth or Alturus Lake, east foot of Sawtooth Mountains, Idaho.

Geographic range.—Mountains of south central Idaho, between Snake River and the Salmon.

General characters.—Size medium, larger than *gapperi;* conspicuously different in color from any known species, the sides being clear gray; tail longer than in *gapperi* or *galei;* ears not tipped with rufous; skull narrow and smoothly rounded.

Color.—Dorsal stripe well defined, extending from in front of ears to rump, pale hazel, somewhat darkened with black-tipped hairs; face, sides, and rump clear ash gray; belly washed with white or whitish; ears sooty gray without rufous tips; feet gray; tail bicolor, gray below, blackish above. Side glands scarcely visible in the specimens at hand.

Cranial characters.—Skull long, narrow, and smooth, convex interorbitally; zygomatic arches very oblique; rostrum long; posterior margin of palate straight; pterygoids long and slender, longer, straighter, and farther apart than in *E. saturatus;* audital bullæ long and laterally appressed; basioccipital wide between bullæ; incisors pale yellow.

Measurements.—Type, measured in flesh by Dr. C. Hart Merriam: total length, 153; tail vertebræ, 48; hind foot, 20. Average of 4 adults from type locality measured by A. H. Howell: 148; 44; 20.2. *Skull* of type: basal length, 23.5; nasals, 8; zygomatic breadth, 13.3; mastoid breadth, 11.6; alveolar length of upper molar series, 5.4.

Remarks.—Three specimens from the Salmon River Mts. differ slightly from the type, but the difference may be individual. Specimens of *E. saturatus* from the Craig Mts., Idaho, and of *E. galei* from the Beartooth Mts., Montana, though geographically near, show no close affinity with *E. idahoensis.*

Specimens examined.—Total number, 15, from the two following localities:

Idaho: Sawtooth or Alturas Lake, 12; Salmon River Mts., 3.

Evotomys mazama Merriam.

Evotomys mazama Merriam, Proc. Biol. Soc. Wash., vol. XI, p. 71, April 21, 1897.

Type locality.—Crater Lake, Mt. Mazama, Oregon; altitude, 7000 feet [2130 meters].

Geographic distribution.—Crest of the Cascade Mountains in Oregon.

General characters.—Large, long tailed, and bright colored; ears not rufous; skull broad and angular; side glands conspicuous in all of the adult males.

Color.—Dorsal stripe extending from in front of ears to base of tail, cinnamon rufous or hazel, shading gradually into buffy gray of sides and face; belly washed with buffy white; oval spot covering side glands slaty gray, more or less frosted with white-tipped hairs; feet grayish white; tail sharply bicolor, whitish below, blackish above.

Cranial characters.—Skull angular, with unusually flat top, long, straight rostrum, and abruptly spreading zygomata; audital bullæ large; pterygoids prominent, wide, and inflated at the tips; palatines rounded anteriorly, with a median posterior projection; enamel surface of incisors orange.

Measurements.—Average of 4 adult males from type locality measured by Dr. C. Hart Merriam: total length, 157; tail vertebræ, 52; hind foot, 18.7. *Skull* of type: basal length, 23.3; nasals, 7.2; zygomatic breadth, 14.2; mastoid breadth, 12.4; alveolar length of upper molar series, 5.

Remarks.—Evotomys mazama differs from *E. saturatus* in slightly larger size and longer tail; in yellower, less sharply outlined dorsal stripe; no tendency to white throat patch; in more angular skull with larger audital bullæ and pterygoids; in orange instead of pale yellowish enamel of upper incisors, and most conspicuously in form of palatine bones. From the dark colored coast species it differs conspicuously in color, but with *E. obscurus* it needs careful comparison.

Specimens examined.—Total number, 19, from 2 localities:

Oregon: Crater Lake, 16; Mount Hood, 3.

Evotomys obscurus Merriam.

Evotomys obscurus Merriam, Proc. Biol. Soc. Wash., vol. XI, p. 72, April 21, 1897.

Type locality.—Prospect, Upper Rogue River Valley, Oregon.

Geographic distribution.—West slope of the southern Cascade Range and northern Sierra Nevada in southern Oregon and northern California.

General characters.—A rather large, grayish species, with small gray ears and indistinct markings; side glands inconspicuous, but easily discovered on blowing apart the fur. The characters given are mainly those distinguishing the species from *E. mazama.*

Color.—Upper parts olive gray, with an ill defined dorsal area of cinnamon rufous, obscured by black hairs; lower part of sides and face clear gray; belly washed with dull buff; ears dusky, not rufous tipped; feet dusky gray; tail distinctly bicolor in specimens from the type locality, more sharply bicolor in specimens from Carberry Ranch, California.

Cranial characters.—Skull less angular and abruptly spreading than that of *E. mazama* and with a more arched dorsal line; rostrum short, decurved, with lower outline well arched; incisive foramina short and wide; palatines and audital bullæ as in *E. mazama.*

Measurements.—Type specimen, measured in the flesh by E. A. Preble: total length, 155; tail vertebræ, 47; hind foot, 17. *Skull* of type: basal length (basion to gnathion), 21.8; zygomatic breadth, 13.3; mastoid breadth, 11.5; alveolar length of molar series, 4.5.

Remarks.—The series of specimens includes both young and adult individuals collected in May, August, September, and December, but apparently none in full winter pelage. In both geographic position and specific characters this species lies between *E. mazama* of the summit of the Cascades and *E. californicus* of the coast region. On the side of Mount Mazama it almost or quite meets the range of *E. mazama*, with which none of the specimens show evidence of intergradation. Specimens from Carberry Ranch show a slight approach toward *californicus*, and future collections may prove *obscurus* to be a lighter-colored, interior form of that species.

Specimens examined.—Total number, 10, from 5 localities:

Oregon: Prospect, 4; west side of Crater Lake, 1; Grand Pass, 1; Siskiyou, 1.

California: Carberry Ranch (near Montgomery Creek), Shasta County, 3.

Evotomys californicus Merriam.

Evotomys californicus Merriam, North American Fauna No. 4, p. 26, pl. ii, fig. 2, Oct. 8, 1890.

Type locality.—Eureka, Humboldt Co., California.

Geographic distribution.—Coast strip of Oregon and northern California.

General characters.—One of the largest, darkest, and longest-tailed species in North America. Dorsal area ill defined; ears small, and in May and

June specimens almost naked, not rufous; lateral glands well defined in half of the specimens examined, conspicuous in the type and two other old males.

Color.—Upper parts dark bister or sepia, becoming dusky on rump and dull, dark chestnut on back; dorsal area indistinct and shading gradually into color of sides; oval patches of dense fur covering side glands plumbeous in slight contrast to surrounding fur; belly pale buffy or soiled whitish, darkened by the plumbeous under fur; tail sharply bicolor, blackish above and at tip all round, whitish beneath; feet whitish or but slightly dusky; ears dusky, with no rufous or light-colored hairs.

Cranial and dental characters.—Skull thick and heavy, with short, stout decurved rostrum; audital bullæ and pterygoids both relatively and actually larger than in any other species; palatines usually triangular in outline instead of U-shaped, as in other species, and with a triple or single pointed posterior projection; zygomatic arches bent well down and not abruptly spreading; molars wide and heavy; enamel folds crowded longitudinally and irregular; posterior upper molar short, with terminal loop very small or, in 4 specimens out of 6, absent.

Measurements.—Type, measured in flesh by T. S. Palmer: total length, 161; tail vertebræ, 50; hind foot, 21. An adult ♂ from Yaquina Bay, Oregon, measured by B. J. Bretherton: total length, 163; tail vertebræ, 55; hind foot, 20. *Skull:* basal length, 22.8; nasals, 7.5; zygomatic breadth, 14; mastoid width, 12.3; alveolar length of upper molar series, 5.3.

General remarks.—In geographic position this species lies nearest to *E. obscurus* on the east and to *E. occidentalis* on the north, and with these species only does it need comparison. The darker color, larger size, and longer tail distinguish it at a glance from *E. obscurus* without reference to the numerous cranial differences. Specimens from localities away from the coast (Willetts and Sherwoods, near the center of Mendocino County, California) are somewhat smaller and lighter colored than the type, which suggests that the species may grade into *E. obscurus*, though at present no intermediate specimens are available. *E. californicus* is readily distinguished from its northern neighbor, *E. occidentalis*, by light feet and belly, bicolor tail, larger size, and blacker coloration, in contradistinction to the sooty feet and belly, concolor tail, smaller size, and more rufous back of *occidentalis*.

Specimens examined.—Total number, 9, from the 5 following localities:
California: Eureka, 1; Willetts, Mendocino County, 3; Sherwoods, 3.
Oregon: Yaquina Bay, 1; Oregon City, 1.

Evotomys occidentalis Merriam.

Evotomys occidentalis Merriam, North American Fauna, No. 4, p. 25, pl. ii, fig. 1, Oct. 8, 1890.

Evotomys pygmæus Rhoads, Proc. Phila. Acad. Nat. Sci., p. 284, October, 1894.

Type locality.—Aberdeen, Washington.

Geographic distribution.—Coast and Puget Sound region of Washington and southern British Columbia.

General characters.—Size considerably less than *californicus;* dorsal area indistinct; tail long and slender; concolor ears nearly naked, not large, but conspicuous above the short summer fur; tail and feet scantily haired in summer specimens; lateral glands conspicuous in 2 out of 3 adults from Aberdeen.

Color.—August specimens from Aberdeen: dorsal area ill defined, sometimes indistinct, varying from dull burnt umber to dark chestnut, darkened by numerous black-tipped hairs; sides dusky gray with a buffy suffusion; an oval patch of darker sooty gray covering side glands in the type and two other specimens; tail almost concolor, blackish; feet dusky or blackish; belly salmon-buff, the dusky under fur showing through; nose blackish.

Cranial characters.—Skull thin and light, without prominent angles and processes, relatively narrow and slender, with gently arching zygomata; anterior part of palate from molars to incisors well arched; audital bullæ much inflated, crowding close together over basioccipital; pterygoids flat, thin, and much perforated at base; palatines with a rounded or notched posterior projection; molars normal; anterior surface of upper incisors orange, in strong contrast to the pale yellowish of those of *E. saturatus.*

Measurements.—Type, measured in the flesh by T. S. Palmer, ♂ ad.: total length, 145; tail vertebræ, 45; hind foot, 18. Average of 3 adults from type locality: 146; 47; 18.3. *Skull* of type: basal length, 22; nasals, 7; zygomatic breadth, 12.5; mastoid breadth, 11; alveolar length of molar series, 4.7.

Remarks.—This species is peculiar to the low, moist coast and sound region—the 'Webfoot country'—where its dark color blends with the shadows of dense vegetation. In general the color is nearly as dark as that of *E. californicus*, but the rich brown on the back, the concolor, dusky tail, and dusky feet are the characters most sharply distinguishing it from neighboring species. There is a possibility of intergradation with *E. californicus* on the south, as well as with *E. saturatus* of the mountains farther east. Specimens from Port Moody, B. C., while agreeing closely with the type in all external characters, show a slight departure in cranial characters in the more angular skull, paler incisors, and smaller audital bullæ. A half-grown specimen from the head of Cascade River is slightly lighter and brighter colored than specimens of the same age from the type locality.

Evotomys pygmæus Rhoads, from the mouth of the Nisqually River, Washington, is based on small size, and was described as the smallest species of the genus, measuring 120; 34; 16. In a series of 9 specimens from Tenino (16 miles SW. of the mouth of Nisqualla River), adult specimens, measured in the flesh by C. P. Streator, range from 136; 40; 18 to 155; 49; 18. Two not fully adult specimens from Steilacoom (8 miles NE. of the mouth of Nisqually River) measure 125; 36; 16.5 and 128; 39; 17. In brief, specimens from Tenino and Steilacoom localities close by and on both sides of the type locality of '*pygmæus*' agree within the limits of individual and slight seasonal variation in size, color, and cranial characters with specimens from Aberdeen, the type locality of *E. occiden-*

talis. It is evident, therefore, that *E. pygmæus* Rhoads is the young of *E. occidentalis.*

Specimens examined.—Total number, 19, from 5 localities.

Washington: Aberdeen, 6; Tenino, 10; Steilacoom, 2; head of Cascade River, 1 im.

British Columbia: Port Moody, 1.

Evotomys nivarius * sp. nov.

Type from Olympic Mountains, Washington, at altitude of 4000 feet [1220 meters], on NW. slope of Mt. Ellinor. No. 66203, ♀ ad., U. S. Nat. Mus., Biological Survey Coll. Collected July 9, 1894, by C. P. Streator. Collector's number, 4025.

Geographic distribution.—Mt. Ellinor and probably other high peaks in the Olympic Mountains.

General characters.—Size and proportions about as in *E. occidentalis*, but color lighter and brighter, with skull more angular. Fur long and lax; ears small and scantily haired; tail and feet slender, well covered with short hair.

Color.—Dorsal stripe well defined, extending from anterior base of ears to base of tail, dull light chestnut; sides dark gray with little buffy suffusion; belly thinly washed with soiled whitish, darkened by plumbeous under fur; postauricular spots whitish; ears dusky; tail distinctly bicolor, soiled whitish below, dusky above; feet dirty white.

Cranial characters.—Skull short, wide, angular, and flat; zygomatic process of maxilla projecting at right angles to axis of skull; zygomatic process of squamosal spreading; frontals deeply concave postorbitally; lateral ridges of frontals and parietals prominent; audital bullæ as large as in *E. occidentalis;* pterygoids slender; palatines short, anterior edge truncate or rounded, posterior edge straight; tooth pattern different in each of the three specimens; incisors yellow like those of *E. occidentalis.*

Measurements.—Average of 3 adult females from type locality, measured in the flesh by C. P. Streator: total length, 150; tail vertebræ, 50; hind foot, 18. *Skull* of type: basal length, 21; zygomatic breadth, 13; nasals, 6.5; mastoid breadth, 11.5; alveolar length of upper molar series, 5.

Remarks.—The specimens from the type locality were caught on July 9, at the edge of an alpine lake, at about 4000 feet altitude. At that date Mr. Streator roports about one-third of the lake covered with ice and snow from the previous winter, while deep snow drifts lay on most of the neighboring slope. Ice formed over the water almost every night during his stay, from July 8 to 11. The snow banks do not entirely leave Mt. Ellinor during the summer. At this altitude the timber is smaller and more scattered and the undergrowth less dense than lower down.

The species shows no close relationship with any other, except *occidentalis.* The types of these two are widely different, but specimens from the vicinity of Lake Cushman, at the east base of the Olympic Mountains, show either that the two species meet there or that intergrades occur. A more complete series of specimens is needed to prove intergradation, and until such a series is obtained *E. nivarius* may stand as a full species.

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* The name *nivarius* seems appropriate to this alpine species, found in close proximity to snow banks that never melt.

Specimens examined.—Total number, 6, from three localities.

Washington: Mt. Ellinor, 3; Lake Cushman, 2; Skokomish River (10 miles above Lake Cushman), 1.

[The account of the following species is contributed by Outram Bangs.]

"**Evotomys proteus** sp. nov.

" *Type* from Hamilton Inlet, Labrador. No. 4081, ♀ old adult, coll. of E. A. and O. Bangs. Collected Aug. 27, 1895, by C. H. Goldthwaite.

" *General characters.*—Size largest of the northeastern forms; ear and hind foot large; colors very variable; usual coloring of adults yellowish or grayish, with a darker (often sooty) dorsal stripe. Red-backed individuals are in a small minority, and even these have the face gray; feet and tail more hairy than in *gapperi* or *ochraceus;* skull large and angular, with deep interorbital constriction, behind which the brain case expands more squarely than in either *gapperi* or *ochraceus*, with more strongly marked spur-like process of squamosal.

" *Color.*—The color of this mouse varies enormously. The type (representing the color phase that seems to be most usual): sides, flanks, cheeks, and face smoke gray, somewhat shaded with yellowish and drab, darkening on back into a broad dorsal stripe of sepia, and paling off on under parts to light smoke gray; feet and hands dull gray; tail indistinctly bicolor, dusky above, dull gray below, hairy. No. 4088 has the whole upper parts, back, and sides dull yellowish, the dorsal stripe slightly darker. No. 4054 has the sides darker yellowish brown and the dorsal stripe bright chestnut, while No. 4139 is slaty all over, slightly paler below, and darker dorsally. Every degree of intermediate coloration can be found between these extremes.

" *Cranial characters.*—The skull is larger than that of either *gapperi* or *ochraceus*, the brain case more angular, the interorbital constriction deeper, and the forward spur-like process of squamosal much more strongly marked. The dentition does not appear to differ materially from that of either *gapperi* or *ochraceus*.

" *Measurements* (taken in the flesh by collector).—The type, ♀ old adult: total length, 171; tail vertebræ, 53; hind foot, 21; ear from notch, 17. Average of the 20 largest adult specimens: total length, 161.8; tail vertebræ, 48.83; hind foot, 20.47; ear from notch, 17.75."

EXPLANATION OF PLATE III.

FIG. 1. *Evotomys rutilus* (Pallas).
ad., Syd Varanger, Finmark, Norway, No. 6555, Merriam Coll.
1, top of skull; 1*a*, palate region.

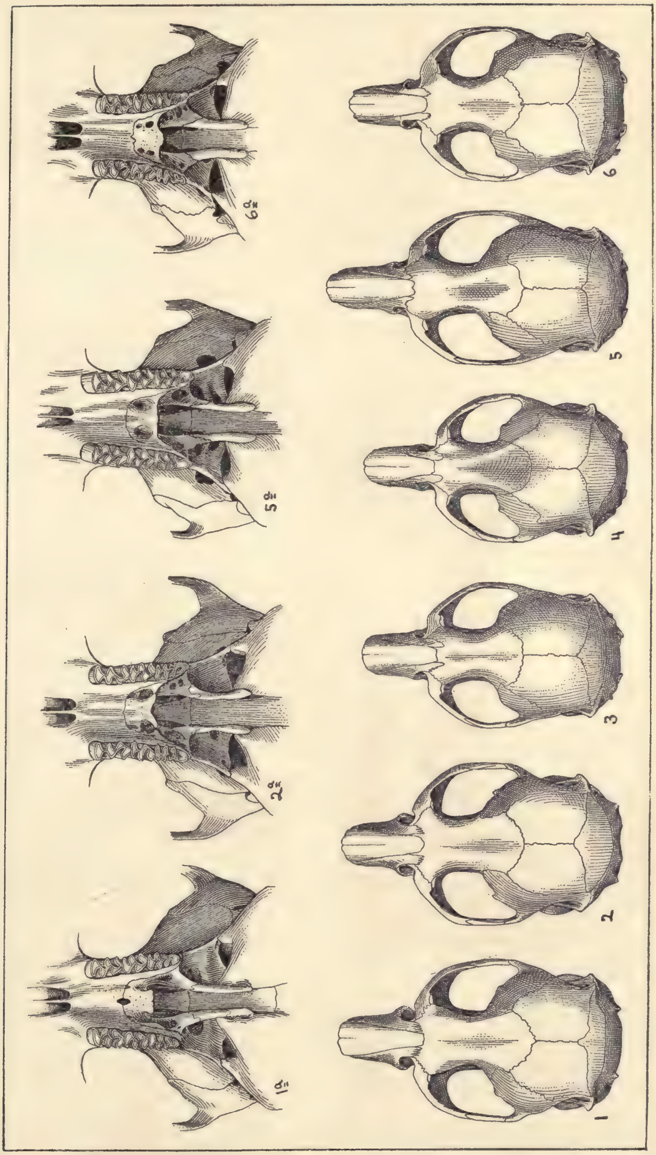
2. *Evotomys dawsoni* Merriam.
♂ ad., Yakutat, Alaska, No. 73566, U. S. Nat. Mus., Biological Survey Coll.
2, top of skull; 2*a*, palate region.

3. *Evotomys loringi* subsp. nov.
♂ ad. (type), Portland, Traill Co., N. Dakota, No. 75795, U. S. Nat. Mus., Biological Survey Coll.
3, top of skull.

4. *Evotomys nivarius* sp. nov.
♀ ad. (type), Mt. Ellinor, Olympic Mts., Washington, No. 66203, U. S. Nat. Mus., Biological Survey Coll.
4, top of skull.

5. *Evotomys wrangeli* sp. nov.
5. ♀ ad. (type), Wrangel Island, Alaska, No. 74724, U. S. Nat. Mus., Biological Survey Coll. (5*a*, same locality; No. 74730.)
5, top of skull; 5*a*, palate region.

6. *Evotomys mazama* Merriam.
6. ♂ ad. (type), Crater Lake, Oregon, No. 79913, U. S. Nat. Mus., Biological Survey Coll. (6*a* ♂, same locality; No. 79915.)
6, top of skull; 6*a*, palate region.


1♀
2♀
5♀
6♀
1
2
3
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5
6

1. EVOTOMYS RUTILUS
2. E. DAWSONI
3. E. LORINGI
4. E NIVARIUS
5. E. WRANGELI
6. E. MAZAMA

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PROCEEDINGS

OF THE

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DESCRIPTION OF A NEW BAT FROM MARGARITA ISLAND, VENEZUELA.

BY GERRIT S. MILLER, Jr.

Through the kindness of Mr. F. W. True, curator of mammals in the U. S. National Museum, I have been permitted to examine the bats collected by Lieut. Wirt Robinson on Margarita Island, Venezuela, in July, 1895. Among them is a specimen of *Rhogeëssa* which differs considerably from any of the Mexican species of the genus, and without doubt represents an undescribed insular form. It may stand as:

Rhogeessa minutilla sp. nov.

Vesperugo parvulus Robinson, Proc. U. S. National Museum, XVIII, p. 651, 1896.

Type from Margarita Island, Venezuela. No. 63216, ♂ ad., U. S. National Museum. Collected July 8, 1895, by Lieut. Wirt Robinson. Collector's number, 463.

General characters.—Most like *Rhogeëssa tumida* H. Allen, but much smaller.

Color.—Fur everywhere light yellowish brown to base, the hairs on the back tipped with chestnut; ears and membranes in dry specimen dark brown.

Skull and teeth.—The skull of *Rhogeëssa minutilla* is smaller than that of *R. tumida*, and apparently has a narrower brain case; but as it is injured, the cranial characters cannot be determined with certainty. Teeth essentially as in *R. tumida.*

Measurements.—Total length, about 65; tail vertebræ, 25; tibia, 11; foot, 5; forearm, 25; thumb, 3.6; longest finger, 51; ear from meatus, 11.8; width of ear, 8; tragus, 6.4; greatest length of skull, 11.8; upper tooth row, 5; lower tooth row, 5.6; mandible, 9.

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BIOLOGICAL SOCIETY OF WASHINGTON

DESCRIPTION OF A NEW VOLE FROM KASHMIR.

BY GERRIT S. MILLER, JR.

Mr. Oldfield Thomas, of the British Museum, has recently sent me for determination a vole collected by Dr. J. E. T. Aitchison, F. R. S., at Gulmerg, Kashmir. The specimen proves to be a *Microtus* of the subgenus *Hyperacrius*.* It differs from *Microtus fertilis* (True),† the only other known member of the subgenus, in several important characters, and evidently represents a new species, which may stand as:

Microtus aitchisoni ‡ sp. nov.

Type from Gulmerg, Kashmir, altitude 9000 feet. Adult ♂ (in alcohol), British Museum collection (not registered). Collected by Dr. J. E. T. Aitchison.

General characters.—General appearance much as in *Microtus fertilis* (True), but size considerably larger and color apparently yellower.

Color.—Color on back bister slightly darkened with blackish and fading rapidly on sides into light yellowish wood brown of belly; tail obscurely bicolor, dark brown above, light yellowish brown below; feet dusky; whiskers scant and short, the longest reaching about to ears, mixed brown and silvery gray.

Skull.—The skull of the type is reduced to fragments, but these indicate that it was considerably larger than that of *M. fertilis.*

Teeth.—The teeth of *Microtus aitchisoni* are uniformly much larger than in *M. fertilis*, but the enamel pattern is essentially as in the latter.§

Measurements.—Total length, 135; tail vertebræ, 33; hind foot, 19; front foot, 13; ear from meatus, 12; ear from crown, 7.4 (from specimen in alcohol); maxillary tooth row, 7; mandibular tooth row, 6.8.

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* See North American Fauna No. 12, p. 54.

† Proc. U. S. National Museum, XVII, p. 10, 1894.

‡ At Mr. Thomas' request, this vole is named after the collector of the type specimen.

§ For figure of enamel pattern of *Microtus fertilis*, see North American Fauna No. 12, p. 55.

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DESCRIPTION OF A NEW MUSKRAT FROM THE GREAT DISMAL SWAMP, VIRGINIA.

BY DR. C. HART MERRIAM.

Among the new mammals obtained at Lake Drummond, in the heart of the great Dismal Swamp, is a curious Muskrat. It is by far the handsomest of the three forms thus far recognized in the genus, and differs from them all in color and in the large size of the teeth.

Fiber macrodon sp. nov.

Type from Lake Drummond, Dismal Swamp, Va. No. 75940, ♀ ad., U. S. Nat. Mus., Biological Survey Coll. Collected Oct. 9, 1895, by Dr. A. K. Fisher. Original No. 1788.

General characters.—Similar to *Fiber zebethicus*, but color very much darker; incisor and molar teeth very much larger.

Color.—Entire upper parts, abdomen, and spot on chin blackish brown, darkest and richest on back; throat, sides of face, anterior part of breast (to plane of fore legs), and inguinal region soiled whitish or very pale drab, more or less tinged with pale fulvous; long hairs of sides and belly tipped with pale dull fulvous.

Cranial and dental characters.—Skull similar to that of *F. zebethicus*, but braincase more elongated posteriorly; squamosal root of zygoma more sloping (not standing out so squarely); incisors heavier (upper ones measuring 7.5 mm. across cutting edges); molars much larger and heavier, the upper series measuring about 16 mm. on crowns.

Remarks.—The large teeth and remarkable color of the Lake Drummond Muskrat suffice to distinguish it at a glance. Whether or not there is a seasonal color change cannot be determined from the material at hand.

Measurements.—Type specimen: total length, 567; tail vertebræ, 244; hind foot, 80.

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DESCRIPTIONS OF A NEW EAGLE FROM ALASKA AND A NEW SQUIRREL FROM LOWER CALIFORNIA.

BY C. H. TOWNSEND.

The following very distinct forms are among the collections contributed by the writer to the U. S. National Museum between 1889 and 1895:

Haliætus leucocephalus alascanus new subspecies.

Subspecific characters.—Differing from *H. leucocephalus* in size, being considerably larger.

Habitat.—Alaska.

Type.—♂ (U. S. Nat. Mus. No. 151,567). Unalaska, Aleutian Islands, May 22, 1895. C. H. Townsend.

Dimensions of Type.—Wing, 23.75; tail, 11.50; tarsus, 4; culmen, 2.60; depth of bill, 1.50; hind claw, 1.50.

Comparative Measurements.

Locality.	Averages.	Wing.	Tail.	Tarsus.	Bill.		Claw of hind toe.
					Length.	Depth.	
Florida..........	4 ad. ♂s.	21.12	10.43	3.40	2.43	1.27	1.50
Florida and Louisiana..........	3 " ♀s.	22.75	11.31	3.42	2.45	1.32	1.60
Aleutian Islands .	4 " ♂s.	23.81	11.56	4.18	2.50	1.40	1.62
" "	2 " ♀s.	24.62	12.00	3.75	2.62	1.50	1.75

In forty specimens examined from localities between Florida and Alaska there is a regular increase in size northward. Eagles from northern States are larger than those from Florida and Louisiana. In addition to the other differences in size, the bill of the Alaskan bird is wider, while the edging to the feathers, especially on the wing coverts, is both lighter and broader. The egg of the northern bird is distinctly larger, the average of sixteen specimens being 73.5 x 57.5 mm., while that of forty-five Florida specimens is 69 x 53.5 mm.

Sciurus hudsonius mearnsi new subspecies.

Sciurus hudsonius californicus Allen. Bull. Am. Mus. Nat. Hist., III., 1890, pp. 165–167.

This form is characterized by extreme pallor of coloration and by having middle dorsal region tinged pale yellowish instead of reddish, as in specimens from central and northern California. A general hoariness pervades the entire upper surface; under surface pure white, without traces of annulation; under fur light plumbeous throughout. These specimens have a broad black lateral stripe. The ears are conspicuously tufted with long black hairs, while the top of the head is pale grayish instead of blackish, as in specimens from more northerly localities. Tail with lateral hairs very broadly tipped with white; median area of under side whitish gray, of upper side yellowish gray; terminal third black, fringed with white. Fore and hind feet yellowish white. One specimen (No. 18267, U. S. Nat. Mus.) has acquired the post-breeding pelage on the fore but not on the hind feet, the new hair being buff-yellow instead of soiled white. Specimens from the interior region of northern California are much darker, with distinctly more reddish upper tinge and less hoariness, while the under fur is decidedly darker plumbeous. Specimens of *S. hudsonius mogollonensis* and *S. hudsonius fremonti* have a more general reddish suffusion of the upper parts, and in winter much dusky vermiculation of the under surfaces, while the feet are nearly black and the ear tufts less pronounced.

S. hudsonius mogollonensis is considerably larger, the hind foot measuring 54 mm. in *mogollonensis* against 51 mm. in *mearnsi;* the skull 51 x 28.7 against 48.8 x 27.6.

Type No. $\frac{18266}{25170}$, U. S. Nat. Mus., from San Pedro Martir Mountains, Lower California (altitude about 7,000 feet). Collected in May, 1889, by C. H. Townsend.

Named for Dr. Edgar A. Mearns, U. S. A., Naturalist of the Mexican Boundary Commission of 1892–'94.

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LEPUS BAILEYI, A NEW COTTONTAIL RABBIT FROM WYOMING.

BY C. HART MERRIAM.

In the summer and early autumn of 1893 my assistant, Mr. Vernon Bailey, and I made a biological reconnaissance of the middle part of the State of Wyoming, which we traversed from west to east. On entering the Wind River Basin a short distance south of the town of Lander, the first mammal to attract my attention was a large, pale Cottontail with ears even longer than those of the Arizona Jack Cottontail (*Lepus arizonæ* Allen). The species was new to me, but I became well acquainted with it during the remainder of the season, for throughout our course in the Wind River and Bighorn Basins one or more were seen every day, and not having been disturbed by man they were very tame, often permitting us to pass within 20 feet (7 meters) without taking alarm. When started they usually ran only a short distance and squatted behind a sage brush or greasewood bush, or in the burrow of a prairie dog or badger, with their long ears laid back on the neck. By rushing suddenly toward them several were driven into these burrows. They were most active at dusk, when their large white tails could be seen flashing in various directions. When at rest the tails are lowered and apparently narrowed, so that the gray of the upper surface conceals the white, but the instant the animal starts the tail is raised and bent up on the rump. When partly erected it seems to curve to the left, but when fully up and pressed against the rump it was found to curve to the right (convexity to the left) in seven cases out of eight. In all of these respects it resembles the tail of the white-tailed ground squirrel of the southern deserts *Ammospermophilus leucurus*).

The new Cottontail, which I take pleasure in naming *Lepus baileyi*, after my companion, Mr. Vernon Bailey, is a northern representative of the *arizonæ* series, with which it agrees in the large size of the ears and audital bullæ. It inhabits the Upper Sonoran and Transition Zones and ranges completely across the lower parts of the Owl Creek Mts., which mountains separate the Wind River Basin from the Bighorn Basin. On the north the species follows the Bighorn Basin into Montana, and on the east it was last killed by us on Crazy Woman Creek, a tributary of Powder River in northeastern Wyoming. Southeast of Powder River it was afterward obtained at Douglas by Mr. J. Alden Loring. In the Wind River Basin we found it in company with the short-eared Cottontail (*Lepus nuttalli*), though the latter seemed to be closely confined to the willow thickets along the streams, while the long-eared species was found everywhere over the sage and sarcobatus plains and on the open deserts.

Lepus baileyi sp. nov. Wyoming Cottontail.

Type from Spring Creek, east side Bighorn Basin, Wyoming. No. 56016, ♀ ad., U. S. Nat. Mus., Biol. Survey Coll. Collected Sept. 17, 1893, by C. Hart Merriam and Vernon Bailey. Original No. 4372.

General characters.—Size large; coloration pale; ears and tail very long. Similar in general appearance to *L. nuttalli*, but paler, with much longer ears and tail.

Color.—Upper parts pale pinkish buff, sparingly lined with black hairs; nuchal patch pale fulvous; rump narrowly grayish, lined with black hairs; ears like back, but terminal fourth bordered by black; outer sides of fore and hind legs pale fulvous; fore and hind feet white or whitish, with basal fur on outer side of feet more or less suffused with pale fulvous; pectoral collar (broad and full) and tuft on each side of inguinal region pale buffy fulvous; under parts white; tail white, except a grayish band on dorsal surface.

Cranial characters.—Skull similar to that of *L. arizonæ*, but larger and heavier, with decidedly larger teeth. Contrasted with *L. nuttalli* of the same region, the skull as a whole is larger; the audital bullæ very much larger; the postorbital processes larger, broader, and more produced anteriorly.

Measurements.—Type specimen: total length, 418; tail vertebræ, 50; hind foot, 100; ear from base, 94. Average of 8 specimens from the Wind River and Bighorn Basins: total length, 404; tail vertebræ, 55; hind foot, 96.

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PROCEEDINGS

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THE AFRICAN SWIMMING CRABS OF THE GENUS *CALLINECTES.*[*]

BY MARY J. RATHBUN.

This paper is supplementary to the one on 'The Genus *Callinectes*,'[†] since the publication of which the writer has examined the types of a number of species of doubtful position and has been able to correct the synonymy.[‡] It becomes necessary to change the name of two species, *larvatus* to *marginatus*, *tumidus* to *exasperatus*, and advisable to consider the subspecies, *tumidus gladiator*, a species. One new species is added, *C. latimanus*.

Callinectes marginatus (A. Milne Edwards).

Neptunus marginatus A. Milne Edwards, Arch. Mus. Hist. Nat. Paris, X, 318, pl. xxx, fig. 2, 1861. Gabon. Types examined (3 *juv.* ♀).

Callinectes larvatus Ordway, Boston Journ. Nat. Hist., VII, 573, 1863. Key West, Tortugas, Bahamas, Haiti.

Callinectes larvatus A. Milne Edwards, Crust. Rég. Mex., 225, 1879 (variety of *C. diacanthus*).

Callinectes africanus A. Milne Edwards, *op. cit.*, 229, 1879 (variety of *C. diacanthus*). Cape Verde Islands. Types examined.

Callinectes larvatus, var. *africanus?* Benedict, Proc. U. S. Nat. Mus., XVI, 1893, 537.

Distribution.—African coast: Cape Verde Islands (U. S. Nat. Mus., No. 14880; Paris Mus.); Liberia (Paris Mus.); Beyah River, Elmina, Ashantee (U. S. Nat. Mus., No. 14878); Gaboon (Paris Mus.); St. Paul de Loando (U. S. Nat. Mus., No. 14877). American coast: Florida Keys to Bahia, Brazil.

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[*] Published by permission of the Secretary of the Smithsonian Institution.

[†] Proc. U. S. Nat. Mus., XVIII, 1895, 349–375, pls. xii–xxviii, 1896.

[‡] *C. nitidus* A. Milne Edwards, 1879, is a synonym of *C. arcuatus* Ordway, 1863.

Callinectes gladiator Benedict.

Callinectes tumidus, var. *gladiator* Benedict, Proc. U. S. Nat. Mus., XVI, 1893, 537.
Callinectes tumidus gladiator Rathbun, Proc. U. S. Nat. Mus., XVIII, 1895, 360, 1896.

This form should, I think, be considered a distinct species from *C. exasperatus* (Gerstæcker), 1856* (= *C. tumidus* Ordway, 1863).

Type specimen, ♂.—Carapace, exclusive of lateral spines, wider than in *C. exasperatus;* less convex, but more deeply areolated; the branchial region, besides the two distinct areolæ at the inner angle, has outside these areolæ a higher elevation on which the granules are most crowded. Granules scattered on the lateral regions. Intramedial region wider than in *C. exasperatus*, but posteriorly narrower than in *C. marginatus*. Median teeth of the front small, tuberculiform. Lateral teeth gradually increasing in size from the second to the eighth, excepting that the fifth is slightly wider than the sixth; rather long, and distinctly separated, as in *C. marginatus*. Lateral spine nearly three times the length of the preceding tooth. Abdomen most nearly related to that of *C. exasperatus*.

Additional material.—To this species may be referred two small females, one in spirit, one dried, which are preserved in the British Museum. They were collected on the west coast of Africa by Mr. John Cranch of the Congo Expedition, 1816. One was labeled by Leach '*Lupa Smythianus*,' but was not described.†

In these specimens the lateral spine is more than three times as long as the preceding tooth; the inner supraorbital fissure is open to the base; the abdomen (of the female) is allied to that of *C. marginatus*, but the fifth segment is longer than the sixth. Specimens, also young, of both sexes, in the Berlin Museum, agree with the above.

Dimensions.—Type, immature ♂: Length to median sinus of front, 27.9; to tips of frontal teeth, 28.6; width to tips of spines, 67; to last sinus, 52.3 mm. Immature ♂, Berlin Museum: Length to sinus, 23; to tips of frontal teeth, 23.5; width to tips of spines, 55.5; to last sinus, 42 mm.

Type locality.—Beyah River, Elmina, Ashantee; U. S. Eclipse Expedition, 1889 (U. S. Nat. Mus., No. 14879).

Distribution.—Liberia (Berlin Mus., No. 2979); Chinchoxo, West Africa (Berlin Mus., No. 5568); West Africa, Congo Expedition (British Mus.).

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* *Lupea exasperata* Gerstæcker, Arch. f. Natur., XXII, pt. 1, 129, 1856. Puerto Cabello, Venezuela. Type examined.

† In Appendix No. IV to 'Narrative of an Expedition to explore the River Zaire, usually called the Congo, in South Africa, in 1816, under the direction of Captain J. K. Tuckey, R. N.,' London, 1818, Leach says, under *Lupa*, "Of this genus three new species were discovered, all of which belong to that section in which the hinder lateral spine of the shell is very much elongated."

Callinectes bocourti A. Milne Edwards.

Callinectes bocourti A. Milne Edwards, Crust. Rég. Mex., 226, 1879 (variety of *C. diacanthus*). Rivière de Mullins, 20 miles south of Belize, Honduras. Types examined.

Callinectes cayennensis A. Milne Edwards, *loc. cit.* (variety of *C. diacanthus*). Cayenne. Types examined.

Callinectes ? bocourti Rathbun, *op. cit.*, 360. Not *C. africanus* A. Milne Edwards.

Specimens of *C. bocourti* from British Guiana in the British Museum are labeled "*C. trispinosus* Leach;" so also are specimens of *C. exasperatus* from Jamaica. Probably neither are types, as the locality of *Lupa trispinosa* is not given by Leach.

Distribution.—West Africa: Senegal (U. S. Nat. Mus., No. 18735); Liberia (Berlin Mus., No. 3647); Chinchoxo (Berlin Mus., No. 5566). American coast: Honduras to Rio de Janeiro, Brazil.

Callinectes latimanus Rathbun, new species.

This species is so closely related to *C. toxotes* Ordway, from the west coast of America, that it may be described by comparison with that species.

Cardiac and inner branchial areolets less elevated. Length of intramedial area about equal to, but not exceeding, its posterior width. Four frontal teeth (fig. 6) less advanced, triangular and subacute instead of rounded or lobiform. Suborbital tooth broader toward the extremity. Antero-lateral teeth shorter, that is, less projecting; margins of second to fifth pairs, inclusive, considerably shorter than their basal width.

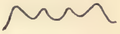

FIG. 6.—*Callinectes latimanus.* Frontal teeth. × ½.

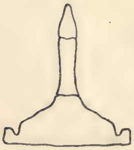

FIG. 7.—*C. latimanus.* Abdomen of male. × ½.

In the abdomen of the male (fig. 7) the third or compound segment is shorter than in *C. toxotes;* the penultimate segment is broader at its proximal end and much constricted at one-third the distance from the proximal end. Sides of terminal segment sinuous. Appendages reaching beyond the tip of the abdomen. In the female the sixth segment is only slightly longer than the fifth.

Meri of chelipeds three-spined on inner margin. Propodus of larger cheliped (fig. 8) with the lower margin very convex below the basal half of the pollex. The fingers are therefore more gaping, the pollex being no wider than in *C. toxotes.*

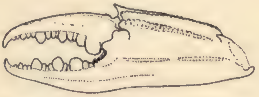

FIG. 8.—*C. latimanus.* Larger chela. × ½.

Dimensions.—♂, No. 19877: Length to median sinus of front, 51 mm.; to tips of frontal teeth, 52.5; width, 115; length of lateral spine, 11.8; of preceding tooth, 4.5.

Type locality.—Lagos, Bight of Benin, Guinea; Sir A. Molony, collector. A fine series of this species is preserved in the British Museum (No. 91. 4. 1). One specimen, a male, has been presented to the U. S. National Museum (No. 19877).

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

A REVISION OF THE NOMENCLATURE OF THE BRACHYURA.*

BY MARY J. RATHBUN.

In reviewing the history of the genera of Brachyura † it is evident that many names in current use violate accepted rules of nomenclature. In the following pages especial attention has been paid to generic names, with incidental notes on the names of species. The Code of the American Ornithologists' Union has been observed in making changes. Many of the problems which have arisen are, however, not covered by the provisions of the code, and recourse to the opinions of individuals has been deemed advisable. The writer is under obligation especially to Dr. Walter Faxon and Dr. Theodore Gill not only for advice, but for much practical assistance. Others whose opinions have been consulted on various doubtful points are Drs. J. A. Allen, W. H. Dall, C. Hart Merriam, T. S. Palmer, C. W. Richmond, L. Stejneger, C. W. Stiles, Profs. A. E. Verrill and S. I. Smith, and Messrs. J. E. Benedict, G. S. Miller, Jr., and R. Ridgway. It is but proper to add that no one but the writer is responsible for errors which may appear.

For convenience, the names which it is thought necessary to change are discussed under ten different headings.

1. *Names diverted from their original meaning.*—Canon XXII of the Code of the American Ornithologists' Union says: "In no

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† The term Brachyura is here used as limited by Miers, 1886, with the addition of the Raninidæ, Alcock, 1896.

case should the name [of the genus] be transferred to a group containing none of the species originally included in the genus." The following names have been thus transferred: *Uca*, *Lupa*, *Leptopodia*, *Clorodius*, *Stenocionops*, and *Naxia* of Leach, *Halimus* and *Platyonichus* of Latreille, and *Stenorynchus* Lamarck.

Uca was established by Leach in Brewster's Edinburgh Encyclopædia, volume VII, 1814,* for the *Cancer uca* or *uka* Shaw, 1802, which he proposed to call *Uca una*. This is a fiddler crab and not the *Cancer Vca* [*uca*] of Linnæus, 1767, and the *Uca una* of the Marcgrave de Liebstad, 1648. Latreille in 1817 (Nouv. Dict. Hist. Nat., XII, 517), rightly considering it a case of mistaken identity, attempted to improve matters by calling Leach's *Uca*, *Gelasimus*, and giving the genus *Uca* to the Linnæan species; but this proceeding is not sanctioned by the rules of today. Before Leach's *Uca* was abandoned its existence was recognized by Say in 1817. *Uca* Latreille may be known as *Ucides*, nov., and its type species as *Ucides cordatus* (Linnæus, 1763) = *Uca una* Marcgrave, 1648, which can no longer "be mentioned as a rare instance of one that has been allowed to possess the names by which it was figured and described centuries ago." (Stebbing, Hist. Crust., p. 84.)

In 1814, Edin. Encyc., VII, 390, Leach placed *Cancer pelagicus* Linnæus, 1758, in the genus *Lupa*, and in the same year, in the

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* There has been some doubt as to the date of Leach's article, 'Crustaceology.' All the volumes of the Edinburgh Encyclopædia bear the date 1830 on the title page. Desmarest and other writers give the dates 1813-1814 for Leach's article. Dr. Stebbing, who has taken pains to collect evidence on the subject, informs me that volume VII of the Edinburgh Encyclopædia gives no dates subsequent to 1814, the history of Denmark being carried down to January of that year. (See also *Challenger* Amphipoda, vol. I, p. 85, and quotation of Leach on page 155 of this article.) It has been suggested that the original article appeared in 1813 and the Appendix in 1814. I believe, however, that the first two pages of the article were published in 1813 and the remainder, including the Appendix, in 1814. In the Edinburgh edition of vol. VII, but not in the Philadelphia reprint, the signatures of the first half are marked "vol. VII, part I," and of the second half "vol. VII, part II." Part II begins on page 385, or the third page of Leach's article, and the inference is that Part I appeared in 1813 and Part II in 1814. All descriptions of genera and species appear in Part II of the volume, and in this part of the original article appear many references to the Appendix and Index, indicating that the Appendix, although written later than the body of the article, was not published later.

Zoological Miscellany, I, 123, pl. liv, described the new species *Lupa forceps.* That the former should take precedence is proved by the following, which appears in Leach's article 'Annulosa' in the Encyclopædia Britannica, Supplement, vol. I, 1816: "This genus was instituted by Dr. Leach in the Edinburgh Encyclopædia, and has since been given with amended characters in the Zoological Miscellany and in the eleventh volume of the Transactions of the Linnean Society." *Lupa* is a synonym of *Portunus* as restricted by Latreille, 1810 (see page 160). Those who do not admit his restriction must use the name *Lupa* in place of *Neptunus* de Haan, 1833. *Lupella*, nov., is proposed for *Lupa forceps* Leach, or the genus *Lupa* of de Haan, 1833. *Portunus* as used by Leach, 1814, and by succeeding writers may be called *Liocarcinus*, a name proposed by Stimpson, 1871, for a perhaps unnecessary division of that genus.

Leptopodia was established by Leach, Edinburgh Encyclopædia, Appendix, 431, 1814, for two species, *Maia phalangium* (Pennant, 1777) Leach [= *Cancer rostratus* Linnæus, 1761 = *Inachus longirostris* Fabricius (sp. 1775), type examined = *Macropodia longirostris* Leach, 1814 (*teste* Leach, 1815)] and *Leptopodia tenuirostris* Leach, 1814 (Appendix), which are congeneric, and the first of which is the type of *Macropodia*, Edin. Encyc., 395, 1814. It should be observed that on page 395 the name *Leptopodia* appears in the synonymy of *Maia phalangium*, thus: '[*Maia*] 8. *Phalangium. C. phalangium* Pennant. *Leptopodia phalangium*, Leach's MSS. See plate ccxxi, fig. 4, and Appendix.' This is followed by '[Genus] XXV. *Macropodia.* Sp. 1. *Longirostris* Fabr. *C. dodecos* L.?' The genus *Macropodia* is then described. As noted above, the species *phalangium* and *longirostris* are identical. The preference should be given to the name of the genus regularly established rather than to one suggested but not adopted. *Leptopodia* of the Appendix, although probably published simultaneously with *Macropodia*, was the result of subsequent revision, and should not, I think, take precedence. *Leptopodia* is therefore a synonym of *Macropodia.* The species *sagittaria*, Fabricius, 1793, which has been considered the type of *Leptopodia*, was not placed in the genus until 1815, Zool. Misc., II, 15, and Trans. Linn. Soc. London, XI, 331, where Leach retains *Macropodia* for *phalangium* and *tenuirostris* and recharacterizes *Leptopodia.* See also Mal. Podoph. Brit., explan. of pl.

xxiii, 1815.* For *Leptopodia* Leach, 1815, not 1814, *Stenorynchus* may be used. (See page 158.)

Clorodius was a manuscript name of Leach, first published, but not adopted,† by Desmarest, 1823, with the name of the type, '*Cancer dentatus* Fabr.,' corrected in 1825 to '*Cancer 11-dentatus* Fabr.' The first citation was an undoubted typographical error, as there is no such species as *C. dentatus* Fabricius. The genus was briefly defined by Desmarest as having fingers with spoon-shaped tips, a character which he includes in his diagnosis of *Cancer 11-dentatus*, but which unfortunately that species does not possess, a circumstance which, it seems to me, does not invalidate the genus. *Clorodius* appears with its original signification in de Haan's 'Fauna Japonica,' 1833. In 1830, Rüppell added to the genus a species, *C. niger* (Forskæl, 1775), having little in common with the type. In 1834, Milne Edwards recharacterized the

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* As the plates of Leach's 'Malacostraca Podophthalma Britanniæ' are not dated and were not issued in numerical order, it is impossible to determine the sequence of publication in a bound copy of the volume. The following table, showing the plates and the date of each number, was kindly furnished me by Mr. Stebbing, who obtained them from Mr. Bernard Quaritch, the publisher of the concluding parts:

Number.	*Plates.*	*Date.*
I	8, 14, 22	Jan. 1, 1815.
II	4, 15, 40	Mar. 1, "
III	17, 28 A, 28 B	May 1, "
IV	19, 29, 41	July 1, "
V	23, 30	Sept. 1, "
VI	1, 2, 26	Nov. 1, "
VII	24, 36	Jan. 1, 1816.
VIII	3, 12, 13	Mar. 1, "
IX	42, 7, 43	May 1, "
X	6, 31, 32	July 1, "
XI	9, 11, 33	Sept. 1, "
XII	21 A, 21 B, 5	Nov. 1, "
XIII	18, 20	Jan. 1, 1817.
XIV	16, 25, 44	Apr. 1, "
XV	22 B, 37 A, 37 B	July 1, "
XVI	22 C, 38, 39	Dec. 1, "
XVII	9 B, 10	Mar. 1, 1820.
XVIII XIX	9 A, 24 A, 27, 34 35, 37 C, 45	1875.

† I believe that if an author defines and publishes a name it becomes available over a later name whether he adopts it or not.

genus, making *C. niger* the type, and this meaning has clung to it to the present day. In restoring *Clorodius* to its original status, it becomes a synonym of *Atelecyclus* Leach, 1814. *Chlorodiella*, nov., is proposed for *Chlorodius* Milne Edwards.

Stenocionops Leach, MS., while not adopted by Desmarest, 1823, was said to include *Maia taurus* Lamarck, 1818, which is synonymous with *Cancer cornudo* Herbst, 1804,* and *C. furcatus* Olivier, 1791. Later, in 1825, the generic name was transferred by Latreille to the species *cervicornis* Herbst, 1803, which has ever since been regarded as the type. In its rightful meaning, *Stenocionops* takes the place of *Pericera* Latreille, Encyc. Méth., X, 699, 1825. *S. cervicornis* may be known as *Ophthalmias* (nov.) *cervicornis.*

Naxia, a manuscript name of Dr. Leach, was first defined and published, but not adopted, by Latreille, Encyc. Méth., Entom., X, 140, 1825, and one species assigned to it, *Pisa aurita*, nov. *Naxia* of Milne Edwards, 1834, has a different definition and contains only the species *serpulifera* Guérin; it should be considered a synonym of *Naxioides* A. Milne Edwards, 1865.

Halimus was very briefly described by Latreille in Cuvier's Règne Animal, ed. 2, IV, 60, 1829. No type was specified, but a single species, *H. aries* Latreille, is figured in Guérin's Iconographie. As this was the only species previous to 1834, it must

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* Perhaps no single copy of Herbst's 'Naturgeschichte der Krabben und Krebse' contains all the title pages of the different parts, and hence quotations from this work are full of inaccuracies. The following table gives the date of issue, number of plates, signatures, and pages of each Heft:

Volume.	Heft.	Date.	Plates.	Signatures.	Pages.
I	1	1782	I	A–L	1–86
I	2–5	1783	II–IX	M–Z	87–182
I	6	1785	X–XIII	Aa–Cc	183–206
I	7	1788	XIV–XVII	Dd–Gg	207–238
I	8	1790	XVIII–XXI	Hh–Mm	239–274
II	1	1791	XXII–XXV	A–F	1–48
II	2	1792	XXVI–XXIX	G–K	49–78
II	3	1793	XXX–XXXIII	L–N	79–98
II	4	1793	XXXIV–XXXVI	O–T	99–146
II	5	1794	XXXVII–XL	U–X	147–162
II	6 et seq.	1796	XLI–XLVI	Y–Ff	163–226
III	1	1799	XLVII–L	A–I	1–66
III	2	1801	LI–LIV	A–F	1–46
III	3	1803	LV–LVIII	A–G	1–54
III	4	1804	LIX–LXII	A–G	1–49

be considered the type. *Halimus*, Milne Edwards, 1834, contained two species, *aries* and *auritus*. The latter was already the type of *Naxia* Leach in Latreille, 1825, and the former the type of *Halimus* Latreille, 1829. *Auritus*, on the contrary, has up to this time been held the type of *Halimus*, *aries* having been put in *Hyastenus* White, 1847, which genus now becomes a synonym of *Halimus*. *Halimus*, it should be noted, was proposed by Latreille, in 1825, for "deux espèces de la collection du Jardin du Roi, et dont l'une paroît être très-voisine du *Cancer superciocisus* [*superciliosus*] de Linné." As this is not sufficient to define the genus, the name must be considered as a *nomen nudum*, at least until its description in 1829.

Platyonichus Latreille, Nouv. Dict. Hist. Nat., XXVII, 4, 1818, was offered as a substitute for *Portumnus*, the orthography of the latter name being considered too near that of *Portunus;* consequently *Platyonichus* must have the same type as *Portumnus*, viz., *P. latipes* (Pennant, 1777). If *Portumnus* be restored, as it has been by many writers, *Platyonichus* becomes a synonym of it, and cannot be used for the species *ocellatus*, as this species was not known to *Platyonichus* until 1825 (Latreille, in Encyc. Méth., Entom., X, 151). *Xaiva* of MacLeay, 1838, is available for *ocellatus* and its allies, the earlier *Anisopūs* de Haan, 1833, being preoccupied by Meigen (Illig. Mag., II, 1803) for Diptera.

Stenorynchus Lamarck, 1818, was a name given to two species, *S. phalangium* and *S. seticornis* Latreille. The former was already a member of *Macropodia*, 1814. The second species is therefore the type of *Stenorynchus*. It is said to be equivalent to *Cancer seticornis* Herbst, 1788, which is congeneric, if not conspecific, with *Cancer sagittarius* Fabricius, 1793. *Stenorynchus* has always been considered synonymous with *Macropodia*.

2. *The name of a composite genus tenable for one or more of its species which do not belong in older genera.*—*Platypodia* is a name given by Bell, Trans. Zoöl. Soc. London, I, 336, 1835, to that group of species included by Milne Edwards, 1834, under *Cancer*. This last genus as defined by Milne Edwards contained none of the Linnæan species of *Cancer*, and therefore the propriety of Bell's action would not be questioned, except for the fact that previous to the publication of Milne Edwards's *Cancer*, four of the species contained therein had been assigned by de Haan, 1833, to *Atergatis* and three other species to *Actæa*. Milne Edwards does not specify the type of *Cancer*, but in illustration of the genus figures

Cancer limbatus. Later, 1839, Randall adopts the name *Platypodia*, coupling it with the same specific name, *granulosus* Rüppell, 1830 = *limbatus* Milne Edwards, 1834. Subsequently all the species of Bell's *Platypodia* were assigned to other genera, viz., *Medæus* Dana, 1851, *Euxanthus* Dana, 1851, *Hypocœlus** Heller, 1861, and *Lophactæa* A. Milne Edwards, 1865, this last genus containing the species *Cancer limbatus* Milne Edwards. The question now arises, should *Platypodia* be considered a synonym of *Atergatis* and *Actæa*, or should it be retained for the species *limbatus?* In reviewing the genera of Brachyura, I find that in all similar cases the name of the composite genus has not been treated as a synonym, *e. g.*, *Goniopsis* de Haan, 1833, contained three species, two of which were already in the genus *Grapsus*, yet the name *Goniopsis* has been used without question for the third species. As a contrary decision would involve many needless changes, *Platypodia* is retained in place of *Lophactæa.*

3. *The name of a composite genus, when made up wholly of older genera, tenable for a component part requiring a name.*—I propose to restore the name *Phalangipus* Latreille, 1825, for *Egeria* Leach, 1815 = *Leptopus* Lamarck, 1818 = *Stenopus* Leach in Latreille, Encyc. Méth., Entom., X, 700, 1825, all preoccupied. (*Egeria* Roissy, an XIII [1804–'5], Mollusca; *Leptopus* Latreille, Gen. Crust. Insect., IV, Addenda, 383, 1809, Hemiptera; *Stenopus* Latreille in Desmarest, Dict. Sci. Nat., XXVIII, 321, 1823, Macrura.) As originally defined, Encyc. Méth., Entom., X, 699, 1825, *Phalangipus* included *Libinia* + *Doclea* + *Egeria*, all genera of Leach, 1815. The name was never used subsequently. A precedent for its restoration now in a restricted sense is to be found in *Maja*, a genus formed by Lamarck, Sys. Anim. sans Vert., 154, 1801, for *Inachus* + *Parthenope*, both of Fabricius, 1798, and first restricted by Leach, 1814, to the species *Cancer squinado* Herbst, 1785, which was a component part of the Fabrician genus *Inachus* under the name *I. cornutus* (not *C. cornutus* Linnæus, 1758). *Maja* or *Maia* in its Leachian sense has been in use without question down to

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* It may be claimed that as *Hypocœlus* was a preoccupied name (see page 164) it was not a genus in the proper sense, and that therefore the species of *Platypodia* (*Cancer sculptus* Milne Edwards) which was referred to *Hypocœlus*, would by the process of elimination be the type of *Platypodia*. On the other hand, *C. sculptus* was an abnormal species of *Cancer* Milne Edwards (= *Platypodia* Bell), and therefore could not legitimately become its type.

the present day, and forms the typical genus of the Maiinæ, Maiidæ, and Maioidea. Should *Phalangipus* be ruled out, *Maja* also must fall. It is of interest that *Maia* was used by Brisson, 1760, for a genus of birds, accepted by many ornithologists.

4. *Specification of type.*—In 1810, Latreille, in his 'Considérations Générales sur l'ordre naturel des animaux composant les classes des Crustacés, des Arachnides, et des Insectes,' gives a supplementary list with the following heading, 'Table des Genres avec l'indication de l'espèce qui leur sert de type.' At the time of the publication of Dr. Herrick's monograph, 'The American Lobster,' I believed that the species designated by Latreille should be regarded as types of their genera, and I am not yet persuaded to reverse that decision. It has been argued "that '*Astacus fluviatilis* Fab.' is given not as *the* type, but merely as *a* type, an example, a specimen of the genus, the handiest one for a Parisian reader to recognize." The French word 'type,' however, is defined as 'type' or 'standard,' not as 'example' or 'illustration,' and although *Astacus fluviatilis* may have been the species most familiar to the Parisian reader, the same cannot be said of *Portunus pelagicus* or *Dromia rumphii*, East Indian species, chosen in preference to European. It has also been claimed that *fluviatilis* is the type of *Astacus* because it was placed first among those enumerated by Fabricius; but if this rule were applied to other Fabrician genera, we should have *fornicata* the type of *Parthenope* instead of *Cryptopodia*, *vigil* the type of *Portunus* instead of *Podophtalmus*, *scabriuscula* the type of *Leucosia* instead of *Philyra*, while *muricatus* would be an *Inachus* instead of a *Doclea*.

The present adoption of Latreille's specification affects the type of only two genera among the Brachyura, *Portunus* and *Leucosia* Fabricius, 1798. The type of the former becomes *pelagicus*, commonly attributed to *Neptunus*, de Haan, 1833, and of the latter, *nucleus*, afterward made the type of *Ilia* by Leach, 1817. *Leucosia* of Leach may be known as *Leucosides*, nov. Latreille in 1810 makes the species *pagurus* the type of *Cancer*. In 1825, in his 'Familles Naturelles,' he forms presumably for this species the genus *Tourteau*, in Gallic form, = *Pagurus* in Berthold's translation, 1827. This circumstance might be a weighty argument against the recognition of the Latreillian species as types, were it not that Leach in the mean time had indisputably restricted the genus *Cancer* to *C. pagurus*, and that in the early days it was not deemed unpardonable to change the type of a genus.

5. *Earlier names neglected.*—A recent example of the abandonment of a valid name is the case of *Holometopus* Milne Edwards, 1853, which is a constituent of de Man's subgenus *Episesarma* of later date, 1895. Other names which have been laid aside without sufficient reason are as follows:

Potamon Savigny, 1816, for *Thelphusa* Latreille, 1819. *Potamon* was restored by Ortmann, Zoöl. Jahrb., Syst., IX, Heft 3, 445, 1896. Its type species is *Cancer potamios* Olivier, an 12 [1803–1804] = *Thelphusa fluviatilis* Latreille, 1819, not *C. fluviatilis* Herbst, 1785.

Charybdis de Haan, 1833, for *Goniosoma* A. Milne Edwards, 1860, on account of *Charybdea* Peron and Lesueur, 1809. *Goniosoma* was itself used by Perty, Delect. An. Art., 201–202, 1830–1834, for a genus of Arachnida.

Pitho Bell, 1835, for *Othonia* Bell, 1836, without explanation. (*Othonia*, Johnston, Loudon's Mag. Nat. Hist., VIII, March, 1835, Vermes.)

Gecarcoidea Milne Edwards, 1837, for *Pelocarcinus* Milne Edwards, 1853, on account of *Gecarcinus* Leach, 1814. *Gecarcoidea* was restored by Ortmann, Zoöl. Jahrb., Syst., VII, Heft 5, 1894.

Xanthodius Stimpson, 1859, if considered congeneric with *Leptodius* A. Milne Edwards, 1863, as it is by some writers, should take precedence, and not be treated as a synonym or a subgenus of *Leptodius*.*

Paulson, 1875, gives *Cryptochirus* Heller as a synonym of *Lithoscaptus* A. Milne Edwards, but the former genus was described in 1861, the latter in 1862.

Arctopsis Lamarck, 1801 (description insufficient ?) is retained by Miers, 1879 and 1886, as a subgenus of *Pisa* Leach, 1814; but if *Arctopsis* be used at all, which seems unwarranted, it must take precedence of *Pisa*. The type species of both is supposed to be the same; its earliest indisputable name is *biaculeata* (Montagu). *Tetraodon*, which Miers makes the type of the subgenus *Pisa*, was not put by Leach into *Pisa* until 1815.

An example of the same name being applied by two authors to the same new genus is that of *Aulacolambrus*, a name attributed

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**Leptodius* is made a synonym of *Xantho* by Ortmann, Zoöl. Jahrb., Syst., VII, Heft 3, 443, 1893.

to A. Milne Edwards, 1878, but first used by Paulson, Investigation of the Kinds of Crabs in the Red Sea, I, 9, 1875,* for *Lambrus pisoides* Adams and White, a member of Milne Edwards's genus *Aulacolambrus.*

6. *Names based on figures without description.—Dorynchus* first appeared in the combination '*Dorynchus thomsoni* Norman,' a species which was figured in the text but not described in Wyville-Thomson's 'Depths of the Sea,' 1873 (fig. 34 on page 174). It is referred to thus: "A pretty little stalk-eyed form *Dorynchus thomsoni*, NORMAN (fig. 34), small and delicate, and very distinct from all *previously described species of the genus*, is very widely diffused." The italics are my own, and the words emphasized may indicate that the word *Dorynchus* was accidentally used for *Inachus*, a genus containing a species *dorynchus.*† *Dorynchus thomsoni* was described and figured in a new genus by A. Milne Edwards, Crust. Rég. Mex., 349, pl. XXXI A, fig. 4, 1880, as *Lispognathus furcillatus.* Later ‡ Prof. Milne Edwards, after recognizing the identity of his species and *D. thomsoni*, refers to it as '*Lispognathus* (*Dorynchus*) *Thomsoni.*' In 1886 Mr. Norman, in his 'Museum Normanianum. Crustacea,' enters the species as '*Lispognathus thomsoni*,' although more recently (December 21, 1895) he has assured me that he sees no reason why *Dorynchus* should be displaced.

A different case is that of *Planes*, a manuscript name of Dr. Leach, published by Bowdich, 1825, the claims of which are set forth by Dr. Faxon in his report on 'The Stalk-Eyed Crustacea' of the 'Albatross,' p. 29, 1895. This name is based on plate figures. In the text, p. 15, Bowdich says: "A small crab, fig. 3, *a* and *b*, which I conceive to be a new species of *planes*, was found in great numbers amongst the *anatiferæ.* [Foot-note:] It was of a delicate, but bright, rose colour: from the symmetrical form of its *test* (notched so regularly as to increase the projection and distinctness of its *chaperon*) it may be called *p. clypeatus.*"

Mr. C. Davies Sherborn in his "Explanation of the Plan adopted for preparing an 'Index Generum et Specierum Animalium,'"[*] says, p. 612: "The figure depicted on a plate may or may not be the drawing intended by the author; it is the work of the artist, who is also responsible for the descriptive legend. In numerous instances the descriptive legend on a plate is quite erroneous, and has been repudiated by the author in his text. Until the text descriptive of a plate appears, the names on the plate must be considered as *nomina nuda*, and it is open to any one to describe and rename such *nomina nuda*."

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* This work is in Russian and was published at Kiew. The title is as follows: 'Izslyedovaniya Rakoobraznuikh Krasnavo Morya.'

† *Inachus dorynchus* Leach, 1814, should be known as *Inachus phalangium* Fabricius, the *Cancer phalangium* of Fabricius, 1775, of which I have examined the type, being different from *C. phalangium* Pennant, 1777, a synonym of *Macropodia rostrata* (Linnæus), 1761.

‡ Comptes Rendus Acad. Sci. Paris, XCIII, 878, 1881.

Is this rule intended to cover cases similar to *Dorynchus*, based on a text figure, and *Planes*, based on a plate figure, the name of which appears in the text without adequate description?

7. *Post-Linnæan name given by a polynomialist invalid.*—In 1763 Vosmaer in Mémoires de Mathématique et Physique, volume IV, established the genus *Notogastropus* for a crab noted and named for having feet on its dorsal as well as its ventral side. While this form was described and figured, no specific name was attached to it. It is without doubt referable to *Dorippe dorsipes* (Linnæus) 1758 = *D. quadridens* Fabricius, 1798. The name *Notogastropus* was never adopted, though it appears in synonymy in Desmarest and de Haan, for the reason probably that Vosmaer was not a binomialist, and for the same reason I have not disturbed the current name *Dorippe*, preferring to follow Rule 44 *b* of the Rules of Nomenclature adopted by the International Zoölogical Congress held in Paris, 1889, which says: "Le nom attribué à chaque genre et à chaque espèce ne peut être que celui sous lequel ils ont été le plus anciennement désignés, à la condition: *b.*—Que l'auteur ait effectivement entendu appliquer les règles de la nomenclature binaire."

8. *Preoccupied names.*—The following new generic names are proposed for names preoccupied in the same kingdom:

Pæduma[†] for *Amorphopus* Bell, 1858. (*Amorphopus* Schönherr, 'in litt.,' Gen. Curc., V, ii, 577, 1840, given as a synonym of *Calodromus;* also Serville, Hist. Nat. des Insectes Orthoptères, Paris, 1839, *teste* Agassiz.)

Æpinus[‡] for *Apocremnus* A. Milne Edwards, 1878. (*Apocremnus* Fieber, Wien Ent. Monschr., II, 320, 1858, Hemiptera.)

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[*] Proc. Zoöl. Soc. London, June 2, 1896, pp. 610–614.

[†] *Παίδευμα*, a rudiment, in allusion to the fifth pair of legs.

[‡] *Αἰπεινὸς*, steep.

Carcinides for *Carcinus* Leach, 1814. (*Carcinus* Latreille, Préc. Car. Génér. Insectes, 197, 1796, Amphipoda.)

Cycloxanthops for *Cycloxanthus* A. Milne Edwards, 1863. (*Cycloxanthus* Milne Edwards, D'Archiac's Hist. Prog. Géol., III, 304 k, 1850, fossil Brachyura.)

Tympanomerus[*] for *Dioxippe* de Man, 1888. (*Dioxippe* Thomson, Fam. Cérambycides, 355, 1860, Coleoptera.)

Ericerodes for *Ericerus* Rathbun, 1893. (*Ericerus* Signoret, 1874, Coccidæ, *teste* Cockerell.)

Hypocolpus[†] for *Hypocœlus* Heller, 1861. (*Hypocœlus* Eschscholtz, Silbermann's Rev., IV, tab., 1836, Coleoptera, *teste* Gemminger and Harold.)

Hapalonotus[‡] for *Malacosoma* de Man, 1879. (*Malacosoma* Hübner, Verz., 192, 1816, Lepidoptera.)

Dasygyius[§] for *Neorhynchus* A. Milne Edwards, 1879. (*Neorhynchus* Sclater, Proc. Zoöl. Soc. London, 1869, 147, Aves.)

Apiomithrax[||] for *Phycodes* A. Milne Edwards, 1869. (*Phycodes* Guenée, Spéc. gén. d. Lép., VI, 389, 1852, Lepidoptera.)

Eriphides for *Pseuderiphia* A. Milne Edwards, 1880. (*Pseuderiphia* Reuss, Denksch. d. k. k. Akad. Wien, XVII, 54, 1859, fossil Brachyura.)

Apias[¶] for *Pyria* Dana, 1851; *pyrum*, a pear. (*Pyria* Saint-Fargeau and Serville. Encyc. Méth., Entom., X, 494, 1825, Hymenoptera; *πῦρ*, a fire.)

Leurocyclus[**] for *Salacia* Milne Edwards and Lucas, 1843. (*Salacia* Lamouroux, Hist. Pol. Coral. Flex., 212, 1816.)

Thersandrus[††] for *Sisyphus* Desbonne and Schramm, 1867. (*Sisyphus* Latreille, Encyc. Méth., Entom., X, 438, 1825, Coleoptera; *Sysiphus*, 1818; *Sisyphe*, 1807.)

Sphenomerides for *Sphenomerus* Wood-Mason, 1891. (*Sphenomerus* Candèze, Mon. Élat., II, 1859, Coleoptera.)

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[*] *Τύμπανον*, a drum or tympanum; *μέρος*, merus.

[†] *῾Υπὸ*, under; *κόλπος*, a hollow.

[‡] *῾Απαλός*, soft; *νῶτος*, back.

[§] *Δασὺς*, hairy; *γυῖον*, limb.

[||] *᾿Α΄πιον*, a pear; *Mithrax*.

[¶] *᾿Α΄πιον*, a pear; with the suffix *ιας*.

[**] *Λευρὸς*, flat; *κυκλός*, circle.

[††] The son of Sisyphus.

Xanthias for *Xanthodes*[*] Dana, May, 1852. (*Xanthodes* Guénée, Spéc. Gén. d. Lép., VI, 209, Jan., 1852, Lepidoptera. Noticed in Bibliographie de la France, Jan. 10, 1852.)

The following published names should be substituted for preoccupied names:

Palicus[†] Philippi, 1838, for *Cymopolia* Roux, 1828. (*Cymopolia* Lamouroux, Hist. Pol. Coral. Flex., 292, 1816.)

Podohuenia Cano, 1889, for *Ixion* Paulson, 1875. (*Ixion* Reitter, Verh. Ver. Brünn, XI, 44, 1872, Coleoptera, *fide* Zoöl. Rec., 1873.)

Dilocarcinus Milne-Edwards, 1853, for *Orthostoma* Randall, 1839, type *O. dentata* Randall, 1839 = *Dilocarcinus multidentatus* von Martens, 1869. (*Orthostoma* Ehrenberg, Symbolæ Physicæ, Anim. Evert., Decas Prima, 1831, Vermes.)

Kaempferia suggested but not adopted by Miers, 1886, for *Macrocheira* de Haan, 1839, 'preoccupied.' (*Macrochira* Meigen, Ill. Mag., 1803, Diptera. *Macrocheirus* Schönherr, Gen. et Spec. Curcul., 1838, Coleoptera, concerning which he says '*Macrocheira* Nov. Gen. et Spec. Dom. de Haan in Litteris.')

The following may be used for names preoccupied though with different gender terminations:

Rhodia Bell, 1835, for *Herbstia* Milne Edwards, 1834. (*Herbstium* Leach in Desmarest, Dict. Sci. Nat., XXVIII, 301, 1823, Macrura.)

Grapsillus MacLeay, 1838, for *Trapezia* Latreille, 1825. (*Trapezium* Humphrey, Mus. Calonnianum, 1797, Mollusca.)

Hypopeltarium[‡] Miers, 1886, for *Peltarion* Hombron and Jacquinot, 1852? (*Peltarium* G. Fischer de Waldheim, Bull. Soc. Imp. Nat. Moscou, XVII, part 1, 106, 1844, Coleoptera.)

Eurypanopeus[§] A. Milne Edwards, 1880, for *Panopeus* Milne Edwards, 1834. (*Panopea* Ménard, Ann. Mus., IX, 135, 1807,

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[*] Ortmann, Zoöl. Jahrb., Syst., VII, Heft 3, 443, 1893, unites *Xanthodes* with *Xantho*.

[†] Since the publication of my 'Synopsis of the American Species of *Palicus* Philippi (= *Cymopolia* Roux),' pp. 93 to 99 of these Proceedings, Professor Jeffrey Bell and Dr. Hilgendorf have kindly sent me copies of the original description of *Palicus*. Though brief, it agrees with *Cymopolia*. Dr. Philippi was doubtless soon convinced of the identity of his genus with the earlier one, as the complete description and figure which he promised to publish in Wiegmann's Archiv never appeared.

[‡] *Hypopeltarium* was substituted by Miers, 1886, for *Peltarion* (name preoccupied) and has been in use ever since.

[§] Admitting that *Eurytium* Stimpson, 1859, is a distinct genus.

Mollusca.) *Panopea* is the name of one of the Nereids. *Cancer Panope* Herbst, from which the name *Panopeus* was derived, doubtless referred to the same character.

Engonionotus,[*] nov., for *Cosmonotus* Adams and White, 1847. (*Cosmonota* Dejean, Catal. Col., 3d ed., 1833. I have seen only the reprint of the 3d ed., 1837.)

Charybdella, nov., for *Cronius* Stimpson, 1860. (*Cronia* H. and A. Adams, Gen., I, 128, 1858, Mollusca.)

Euxanthopsis, nov., for *Euxanthus* Dana, 1851 = *Melissa* Strahl, 1861. (*Euxanthe* Hübner, Verz., 39, 1816, Lepidoptera. *Melissa* Smith, 1854, Cat. Brit. Mus., II, 279, Hymenoptera.)

Raphonotus,[†] nov., for *Fabia* Dana, 1851. (*Fabius* Duncan, Foreign Butterflies, 167, 1837, *teste* Scudder.)

Leucocarcinus,[‡] nov., for *Leucisca* MacLeay, 1838. (*Leuciscus* Cuvier, Règne Animal, ed. 1, 194, 1817, Pisces.)

Zalasius,[§] nov., for *Trichia* de Haan, 1841. (*Trichius* Fabricius, Sys. Entom., 40, 1775, Coleoptera.)

Those names which are spelled alike except for their termination and have different meanings are not considered the same, *e. g.*, *Achæus* Leach, 1817, is not displaced by *Achæa* Hübner, 1816, both being proper names. The same is true of *Nemausa* A. Milne Edwards, 1875, and *Nemausus*, Stål, 1865.

9. *Names given simultaneously to different genera.*—*Acanthodes* was proposed by de Haan, 1833, for a genus of crabs. The same name was used by Agassiz, July, 1833, for a genus of fishes; it was, however, substituted for his *Acanthoessus*, 1832. For this reason, and because it cannot be proved that *Acanthodes* de Haan is of later date, it seems best to preserve the name for the crustacean genus.

Thia Leach, 1815, bears the same date as *Thia* Oken, Lehr. Naturg., 3^{te} Theil, 1^{te} Abth., a genus of Vermes. *Thia* Oken appears in a scheme of classification on p. xiii, and in the index or 'Register' at the end of the same work (p. xvii), but not in the body of the work, where it is called *Amphinome* (*teste* Faxon). It is impossible to tell which genus, Oken's or Leach's, was first published, but as the former is, I believe, a synonym, and perhaps was never used except by Oken, the name *Thia* may properly be used for the crustacean genus.

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[*] *Εγγώνιος*, angular; *νῶτος*, back.

[†] *Ῥαφὴ*, suture; *νῶτος*, back.

[‡] *Λευκὸς*, white; *καρκίνος*, crab.

[§] *Λάσιος*, hairy; *ζα*, intensive prefix.

Kraussia was used by Dana for a genus of crabs,[*] and by Davidson for a genus of mollusks[†] in the same month of the same year, May, 1852; but Davidson in 1859 changed his *Kraussia* to *Kraussina*, acknowledging the priority of Dana's genus.

10. *Original orthography to be preserved except in case of typographical error.*—According to Canon XL of the A. O. U. Code, we should write *Ethusa* not *Æthusa*, *Æthra* not *Œthra*, *Eriocheir* not *Eriochirus*, *Podophtalmus* not *Podophthalmus*, *Zosimus* not *Zozymus*, *Lophozozymus*, *Stenorynchus*, *Dorynchus*, *Loxorynchus*, *Pyromaia* Stimpson, 1871, not *Apiomaia* von Martens, 1873. *Goneplax* Leach, Edin. Encyc., VII, 1814, was spelled *Goneplat* on p. 393, *Goneplax* on p. 430. The first form may be considered a typographical error. *Goneplax* was so used by Leach in 1815; in 1816 written *Gonoplax;* since that time both *Goneplax* and *Gonoplax* by different authors.

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[*] Proc. Acad. Nat. Sci. Phila., VI, 86.

[†] Ann. Nat. Hist., (2) IX, 369.

VOL. XI, PP. 169-171 JUNE 9, 1897

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

TWO NEW PLANTS FROM MOUNT MAZAMA, OREGON.

BY FREDERICK V. COVILLE AND JOHN B. LEIBERG.

Arenaria pumicola, sp. nov.*

Plant forming a rather loose tuft, commonly 6 to 12 cm. high, from a caudex with a deep tap-root and with naked ascending branches commonly 1 to 2 mm. in thickness; stem erect, smooth below, glandular-hairy above, with commonly 1 to 3 pairs of cauline leaves; basal leaves numerous, about 0.5 to 0.7 mm. wide by 10 to 20 or even 30 mm. long, glabrous, glaucous, entire to remotely or sometimes even closely denticulate on the margin, abruptly and rather bluntly acute at the apex, the cauline leaves similar but about twice as broad and seldom more than 10 or 12 mm. long; inflorescence at the first flowering compact, in age open, the branches of the cyme and often the midribs of the sepals glandular-hairy; bracts ovate, acute to acuminate, scarious, glabrous; sepals 2 to 3 or sometimes even 4 mm. long, ovate, with a sharply defined midrib and broad scarious margins, acute or through the expansion of the margins obtuse; petals about twice as long as the sepals, cuneate-oblanceolate, emarginate or erose at the usually truncate apex; stamens about as long as the petals, the anthers commonly purple; ovary globose; capsules at maturity probably nearly twice as long as the calyx; mature seeds not seen.

Type specimen in the United States National Herbarium, collected August 13, 1896, at Crater Lake, Oregon, at an altitude of 2180 meters, by Frederick V. Coville and John B. Leiberg, No. 349.

This plant appears to be most closely related to *Arenaria aculeata* Wats., differing in the naked, ascending, subterranean caudex branches bearing the congested foliage in tufts at their ends; the leaves not very stiff and with only an abrupt, very short, and scarcely pungent horny apex; and the sepals with the green median portion rather narrow, usually abruptly delimited by the broad hyaline margins, and commonly with little tendency to be striate when dry. *Arenaria aculeata* is a plant with spreading, procumbent, matted stems retaining their more scattered widely spreading dead foliage for several years; the leaves stiff, tapering at the apex into an extremely sharp horny spine; and the sepals with a broad midrib not usually sharply delimited and when dry commonly 3 to 5-striate. In the field the plants are at once distinguishable by their strikingly different habit and by the difficulty of handling *aculeata,* the leaves of which readily pierce the skin, a difficulty which was not experienced in the case of *pumicola.*

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* On the ground of euphony the combination of letters *icic*, which in strict etymological practice would occur in this word, has been reduced to *ic*.

Our plant is a characteristic species of the open slopes of pulverized pumice-stone about the rim of Crater Lake, Mount Mazama, Oregon, and specimens in the National Herbarium collected by Lemmon in 1875 show that it occurs also in northeastern California. *Arenaria aculeata* ranges from the plateau of northern Arizona through the mountains of Nevada and Utah to those of southwestern Idaho and eastern Oregon.

Our plant bears considerable resemblance to some herbarium specimens which are referred to *Arenaria congesta subcongesta* Wats., but the type of that complex of forms differs in its spreading instead of erect leaves, slenderer and more persistently leafy branches of the rootstock, longer calyx (about 5 mm.) and glabrous stems and inflorescence.

Cardamine bellidifolia pachyphylla, var. nov.

Plant wholly devoid of pubescence, low, 4 to 8 cm. high, from a branching caudex commonly 2 mm. thick, and with a deep tap-root, the branches usually short, but sometimes long and flexuous; leaves mostly gathered in subrosulate tufts at the ends of the caudex branches, the blades fleshy in texture, even the midrib nearly obliterated, 6 to 12 or even 16 mm. long, obovate to narrowly oblong, rounded at the apex, entire or with an indistinctly defined lobe on either side toward the apex, abruptly or gradually narrowed into petioles 1 to 3 cm. in length and purplish at the base or throughout; flowering stems short, erect, 1 or 2 from each branch of the caudex, 3 to 5 cm. high, leafless or bearing one or two short-petioled oblanceolate or obovate leaflets; inflorescence a short terminal raceme, the flowers seldom more than 10, on pedicels commonly 5 to 10 mm. long; sepals 2 to 3 mm. long; petals a little more than twice as long, spatulate, obtuse, white or rose-colored; siliques about 3 cm. long and 1.5 mm. wide, fastigiately erect on the slender ascending pedicels, the styles exceeding the valves by about 2 mm.; seeds in one row, oblong, flat, not winged, often margined at the distal end, about 2 mm. long by 1 to 1.2 mm. wide, the cotyledons accumbent.

Type specimen in the United States National Herbarium, collected August 15, 1896, at Crater Lake, Mount Mazama, Oregon, at an altitude of 2300 meters, by Frederick V. Coville and John B. Leiberg, No. 426.

The typical form of *Cardamine bellidifolia* is a less robust plant, slenderer throughout, the caudex and its branches commonly about 1 mm. thick; the leaves of a light green color and thinner texture, with venation clearly evident on the back, at least in dried specimens, and the petioles apparently always green throughout; the capsules about 2 cm. long, their styles exceeding the valves by about 1 mm.; the fruiting pedicels seldom exceeding 6 mm., usually less than 5 mm.; and the seeds commonly 1 by 1.5 mm.

Cardamine bellidifolia, a circumpolar plant, is known sparingly in the Western Hemisphere from Greenland to the islands of Bering Sea, southward to the White Mountains of New Hampshire, the Rocky and Selkirk Mountains of British Columbia, and the Cascade Mountains of Washington. As indicated by both American and European specimens, it is a plant of humid habitat, often if not always growing in mossy places and on granitic soil. *C. bellidifolia pachyphylla* occupies geographically a position contiguous to the westernmost arm of southern montane extension of *C. bellidifolia*, namely, the Cascade Mountains of southern Oregon and adjacent isolated peaks in northern California. The soil on which it grows at Crater Lake, where it occurs on the rocky slopes of the Watchman, is a pulverized pumice. This, although in early spring well supplied with moisture from the melting snow, soon becomes very dry at the surface and supports only a scanty vegetation, even mosses being almost entirely wanting. Doubtless on Lassen Peak and Mount Shasta, both of which are volcanic cones, it finds a similar soil. Under these conditions it appears to have differentiated from the typical *C. bellidifolia* by sending down a deeper tap-root for moisture and by developing thicker leaves to accommodate itself to drier surroundings and reduced transpiration.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

NOTES ON THE NOMENCLATURE OF FOUR GENERA OF TROPICAL AMERICAN MAMMALS.

BY T. S. PALMER.

It is generally admitted that stability in nomenclature can only be attained by adhering strictly to the law of priority and adopting the earliest available name for each genus and species. Some of the early writers used native names as generic designations of mammals and birds, but such terms were rejected almost without exception by certain zoölogists, who maintained that only scientific names of classical origin should be used. Illiger, and to a less extent Cuvier, were leaders in the reform against 'barbarous' names, and in carrying out their views did not hesitate to replace earlier names by others which they deemed more appropriate. As their classification of mammals and birds was very generally adopted, their nomenclature was accepted without question. At present, however, derivation is considered of much less importance than priority, and one recent writer, Liais, has even gone so far as to maintain that in the case of South American species scientific names derived from Indian names are preferable to any others. It must be admitted that no valid objections can be urged against barbarous names when such genera as *Alactaga*, *Avahi*, *Babirussa*, *Coendou*, *Indri*, *Linsanga*, and many others receive general recognition.

Some of Cuvier's and Illiger's genera have already been abandoned in favor of earlier ones, but there are still several others, as *Tatusia*, *Dicotyles*, *Cercoleptes*, and *Chrysothrix*, which are unfortunately antedated by valid names. The nine-banded armadillo was placed in a distinct group, *Tatusie*, by Cuvier in 1822, but the name was not published in Latin form until 1827, when it appeared in Lesson's 'Manuel de Mammalogie,' p. 309. As early as 1803, Blumenbach named the same species *Tatu novemcincta*,[*] and in 1809 figured it under the same designation in his 'Abbildungen Naturhistorischer Gegenstände,' No. 83. *Tatu*, having at least 24 years priority, should therefore replace *Tatusia*.

The peccaries are almost universally placed in the genus *Dicotyles* erected by Cuvier in 1817, but in 1814 Fischer proposed *Tayassu*,[†] a modified form of the native name, for the same group. Fischer recognized two species, *Tayassu pecari*, based on *Sus tajacu* of Linnæus, and *Tayassu patira*. He gave full generic and specific descriptions and a list of synonyms for each species. To see that *Tayassu pecari* and *T. patira* were intended as scientific and not as vernacular names, it is only necessary to notice that they are used in precisely the same way as *Sus æthiopicus*, *Tapirus americanus*, and many others on the pages immediately preceding or following the descriptions of these species. *Dicotyles* therefore becomes a synonym of *Tayassu* and necessitates a change in the family from Dicotylidæ to Tayassuidæ.

The kinkajou of tropical America is usually known as *Cercoleptes*, although it has at least 3 earlier names (*Potos* Cuvier and Geoffroy, 1795, *Kinkajou* Lacépède, 1801, and *Caudivolvulus* Dumeril, 1806), which were given as synonyms of *Cercoleptes* by Illiger when he redescribed the genus in 1811. All of these genera were based on the same species, and *Potos*[‡] should be adopted as the earliest available name.

Kaup's genus *Chrysothrix*, described in 1835 for the small squirrel monkeys, is also antedated by the native name *Saimiri*, which was used as a subgenus by Voigt in 1831.[§] Voigt published the species as *Simia* (*Saimiri*) *sciurea*, and his *Saimiri* should have preference over the later *Chrysothrix*.

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[*] Handbuch der Naturgeschichte, 7te Auflage, 1803, 105–106; 10te Ausgabe, 1821, 111. The first edition of this work appeared in 1779, and the name may have been published much earlier than 1803, but I have not been able to examine any of the first six editions.

[†] Zoognosia, III, 1814, pp. 284–289.

[‡] Méthode Mammalogique in Mag. Encyclopédique, lère année, II, 1795, p. 187.

[§] Cuvier's Thierreich, I, 1831, p. 95.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

A NEW FUR-SEAL OR SEA-BEAR (*ARCTOCEPHALUS TOWNSENDI*) FROM GUADALUPE ISLAND, OFF LOWER CALIFORNIA.

BY C. HART MERRIAM.

During the recent international discussion respecting the seals of Bering Sea, the matter of the distribution of the Northern Fur-seal (*Callorhinus ursinus*) has received closer attention than heretofore, and questions have arisen as to the southernmost range of the species in the past.

It had been known for many years that colonies of fur-seals inhabited parts of Guadalupe and the San Benito Islands, off the coast of Lower California, and these seals were commonly assumed to be the northern species—the same that breeds in such numbers at the Pribilof Islands in Bering Sea. But it seemed to me a violation of the known laws of geographic distribution that a species adapted to the arctic climate and cold waters of Bering Sea, and even there requiring constant fogs to protect it from the feeble rays of the sun, should be able to breed under clear skies on the subtropical islands of Guadalupe and San Benito.

During the sessions of the Bering Sea Joint Commission, in February and March, 1892, I made bold to express the opinion that the fur-seal which breeds on these islands would prove to be, not the northern species belonging to the genus *Callorhinus*, but a southern species belonging to the genus *Arctocephalus*. No specimens were at hand for examination, but through the co-operation of the Department of State and Fish Commission I was enabled to send a small boat, in direct charge of Mr. C. H. Townsend, on a special mission to Guadalupe Island.

Mr. Townsend sailed from San Diego on May 14, 1892, reached Guadalupe on the 16th, and remained there until the 27th. He saw seven fur-seals and shot one, which sank before it could be recovered. The trip was made too early in the season to find the seals on shore. A locality was visited where it was known that a large number had been killed a few years previously, and here four skulls were obtained. These skulls were immediately sent to Washington and on their arrival were examined by Dr. J. A. Allen, Dr. Theodore Gill and myself, and proved, as had been suspected, to belong to the genus *Arctocephalus.* A joint note to this effect was published by us in the *Fur-Seal Arbitration, Appendix to the Case of the United States*, vol. I, p. 586, 1892. In the same volume (p. 373) Dr. Allen expresses the belief that the skulls in question represent an undescribed species. The northernmost locality from which the genus had been previously recorded is the Galapagos Islands under the equator, about 2500 miles southeast of Guadalupe.

In his manuscript report on the Guadalupe trip Mr. Townsend states: " Guadalupe Island is thoroughly volcanic and there are caves by the dozen along every mile of the shoreline which were once the retreats of thousands of fur-seals. On the afternoon of May 17 we saw four seals swimming some distance off shore. Two of these we believed to be fur-seals, but could not get within shooting distance, although we tried for an hour. The other two, seen later, were undoubtedly *Zalophus.* No seals whatever were found on the rocks. . . . On May 22 we examined SW Point and the three islands or rocks south of it. On the most southerly rock we found a band of *Zalophus*, about thirty in number, hauled out. There were no fur seals among them. Passing the point, we continued, pulling in the dory, the schooner lying to off shore, up the west side of the island about eight miles, where we anchored. In the evening we visited the spot where Borges and Sisson had killed two or three hundred fur-seals about ten years before. Only a few weather-worn skulls were found, which we gathered for shipment to Washington. The next day, May 23, we hunted along shore, in the boat as usual, as far as the next point south of NW Point about six miles, the schooner keeping well off shore. At 10 AM., near the outlying rocks off this point, we found what seemed to be a male fur-seal, perhaps about four years old, asleep on the water with his fins held aloft in the manner so characteristic of these animals. I got a pretty fair shot with the rifle but missed. Half an hour later I shot a female fur-seal, killing it instantly. Before we could get the hook on it, it sank below our reach, although only three boat-lengths away when shot. The water was perfectly clear and we could see the animal sinking when we reached the bloody spot on the water. It began to sink *immediately* when shot. With an extra long hook we might have reached it. We remained in the neighborhood for an hour, but no more seals were seen. While lying to with the vessel about two miles off this point the Captain saw two fur-seals from the vessel, but was powerless to try getting them. It was on the rocks at this point that Capt. Hunt had killed a pup fur-seal the year before (1891)."

In addition to his own observations Mr. Townsend collected from California sealers some very important information respecting the abundance of the Guadalupe fur-seal and the numbers killed in recent years. This may be summed up as follows:

In 1880 Capt. Geo. W. Chase, of San Diego, made several trips to Guadalupe for fur-seals, which he found "tightly packed in the caves and holes [in the rocks]." He generally fired at their eyes in the darkness of these places, but sometimes used candles. His skins sold for $15 each, from which he made $2,200 in 1880. The same man (Capt. Chase) stated that about a year earlier a Mr. Borges sold his catch of Guadalupe sealskins at San Francisco for over $20,000 (the rate being $10 to $15 per skin).

In 1883 Capt. Geo. E. Wentworth killed about 2,000 fur-seals on Guadalupe. Captain Wentworth states that several other vessels were there at the same time, and that the Guadalupe fur-seal was practically [commercially] exterminated that year—1883.

In 1890 Capt. Nelson told Mr. Townsend that he had killed fur-seals with more or less regularity every year on the exposed shingle beach at the NW end of Guadalupe Island, where he pursued them into the caves and killed them with clubs.

In 1891 Geo. M. Hunt, of San Diego, visited Guadalupe in December for the purpose of sealing and killed 5 fur-seals—4 adults on the east side and one pup on the northwest side. A few others were seen off shore.

Recently I have compared the skulls collected at Guadalupe by Mr. Townsend with a series of skulls of *Arctocephalus australis* or *phillipi* from the Galapagos Islands, also collected by Mr. Townsend, and find the two to be very distinct species. In view of these facts it seems particularly appropriate that the new species should bear Mr. Townsend's name, which I take pleasure in bestowing upon it.

The material on which the new species is based consists of four skulls picked up on the beach. One of these, the type, is an adult male which has lost the teeth and lower jaw. Another is a young adult female with both jaws and all the teeth. The remaining two are very imperfect, lacking both the jaws and face.

The species seems doomed to speedy extermination, and, so far as known, no museum in the world has a single specimen. It is hoped that our National Museum will be able to secure complete specimens before it is too late.

Arctocephalus townsendi sp. nov. Guadalupe Fur-seal.

Type locality.—Guadalupe Island, off Lower California. Type No. 83617, ♂ ad., U. S. National Museum. Collected on the beach on west side of Guadalupe May 22, 1892, by C. H. Townsend.

Cranial characters.—Contrasted with skulls of *Arctocephalus* (*australis* or *phillipi*) from the Galapagos Islands, skulls of *A. townsendi* differ in somewhat smaller size; much shorter rostrum; shorter nasals; larger and more freely open incisive foramina; heavier and shorter ascending branches of premaxillæ, which do not push backward along the nasals as in *australis;* smaller, flatter, and smoother audital bullæ; *much narrower* and more deeply excavated palate; narrower postpalatal notch; broader and heavier jugals; broader zygomatic processes of maxillæ, which are *expanded to form a broad floor under* the anterior half of the orbit; larger, broader, and more rounded anterior nares in the male, and absence of sagittal crest between frontals.

The most important characters are the exceedingly narrow and excavated palate, flat audital bullæ, short and thick ascending arm of premaxilla, and broadly expanded zygomatic root of maxilla, forming a floor under the anterior half of the orbit. There are also tooth characters: the first upper molar (5th molariform tooth) is mainly posterior to plane of anterior root of zygoma; both upper true molars are double rooted, and the last upper premolar is incompletely double rooted.

In the female of *townsendi* the narrow and deeply excavated form of the palate is even more emphasized than in the male, and the postorbital constriction is very much narrower than in the female of *australis.*

Measurements of ♂ Skull of Arctocephalus townsendi (the type).

Greatest basal length (gnathion to occipital condyles)	256
Basal length (gnathion to basion)	243
Basilar length of Hensel (basion to incisors)	233
Palatine length (gnathion to postpalatal notch)	120
Postpalatal length (postpalatal notch to basion)	125
Zygomatic breadth	151
Lateral series of teeth (canine to last molar inclusive)	88
Distance between canines	22.5
Distance between 3d pair of molariform teeth	22.5
Breadth (anteroposterior) of zygomatic root of maxilla between inferior lip of antorbital foramen and orbit	21

VOL. XI, PP. 179-180 JULY 1, 1897

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

A NEW BAT OF THE GENUS *ANTROZOUS* FROM CALIFORNIA.

BY C. HART MERRIAM.

Up to the present time only a single species of the genus *Antrozous* has been recognized. It was described by Le Conte in 1853, under the name *Vespertilio pallidus*, from a specimen said to be from California. But later, both Baird * and Harrison Allen † state explicitly that Le Conte's type came from El Paso, Texas, where it was collected by the U. S. and Mexican Boundary Commission. Moreover, the measurements of the type specimen show that it is the Sonoran desert form—not the Californian.

The specimens collected in Nevada and California by the Death Valley Expedition in 1891 show that the typical form ranges westward from El Paso over the Sonoran deserts of the southern part of the Great Basin as far as Owens Valley, at the east base of the Sierra Nevada, and that another form occupies the region west of the Sierra. The latter was described by me five years ago, under the name *Antrozous pallidus pacificus*, but the description, along with a number of others of new mammals collected by the expedition, was held for the mammal report, which has been so long delayed and which is not likely to be printed for another year. For this reason it is thought best to publish the description in advance of the report, and it is presented herewith.

The Biological Survey has secured a fine series of specimens of *Antrozous*, illustrating its distribution from Mexico to Oregon;

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* Mexican Boundary Survey, vol. II, part II, Mammals, p. 5, 1859.

† Monograph of the Bats of North America, p. 69, 1864.

but since the detailed ranges of the two forms will be given shortly in Mr. Gerrit S. Miller's Monographic Revision of the Vespertilionidæ, they need not be repeated here.

The type of the new form is selected from three specimens shot by me at old Fort Tejon, California, on the evening of June 28, 1891. Two of these three specimens were females containing large embryos, nearly ready for birth.

Antrozous pallidus pacificus subsp. nov.

Type from old Fort Tejon, Cañada des las Uvas, California. No. 29815, ♂, U. S. Nat. Mus., Biological Survey Coll. Collected June 28, 1891, by C. Hart Merriam. Original No. 208.

General characters.—Similar to *A. pallidus* but uniformly larger (forearm averaging 5 mm. or more longer) and darker; ears somewhat narrower (breadth 18 or less instead of 21 or more) and less convex anteriorly, with posterior edge of upper third slightly emarginate instead of straight.

Color.—Upper parts ochraceous buff, strongly washed with dusky; under parts rich buff instead of whitish.

Measurements (of type, from alcoholic specimen).—Head and body, 70; tail, 43; head, 25; ear from external basal angle, 30; tragus from inner base, 10; greatest breadth of ear, 17.5; forearm, 59; thumb, 11; 3d finger, 93; 5th finger, 73; tibia, 21; hind foot, 13.

Vol. XI, pp. 181-183 July 1, 1897

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

DESCRIPTION OF A NEW GENUS AND SPECIES OF SPHÆROMIDÆ FROM ALASKAN WATERS.*

BY HARRIET RICHARDSON.

The dredgings made by the U. S. Fish Commission Steamer 'Albatross' off the Alaskan coast in the years 1888–1894 contain a number of specimens of Sphæromidæ which evidently belong to a genus hitherto undescribed. Although it is impossible to refer these specimens to the genus *Ancinus* of Milne Edwards, yet they are more closely related to that genus than to any other. They resemble *Ancinus* in the possession of subchelate hands terminating the first and second pairs of gnathopods.

Tecticeps gen. nov.

Body oval and somewhat flattened.

Head subquadrangular, broader anteriorly than posteriorly, with its anterior and lateral margins produced, concealing the antennæ.

The antennæ, which are entirely hidden, extend backward and lie under the epimeral plates at the sides of the thorax.

The first and second pairs of legs are subchelate; the first pair terminate in a large hand and finger, bearing a small hook; the second pair terminate in a more irregularly shaped hand. All the other legs are simple in structure.

The terminal segment of the abdomen is triangular and entire and is pointed at its extremity. The uropoda are double-branched and lateral, and resemble closely those of the genus *Sphæroma*.

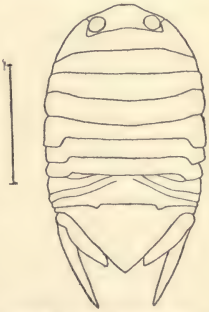

Fig. 9.—*Tecticeps alascensis.* × 2¼.

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*Published by permission of the Secretary of the Smithsonian Institution.

This genus differs from the genus *Ancinus* of Milne Edwards —

1. In having uropoda with two branches instead of one.

2. In having the abdomen entire and not truncate at the tip.

3. In the prominent projection of the anterior and lateral margins of the head.

4. In the concealment of the antennæ, which are very conspicuous in the *Ancinus*.

Tecticeps alascensis sp. nov.

Outline of body oval. Surface quite smooth, but covered with little points of depression.

Head large; twice as long as any one of the thoracic segments. The anterior margin is produced in a way to conceal the antennæ, as are also the antero-lateral margins, making the anterior portion of the head in front of the eyes much broader than the posterior portion, and forming very acute antero-lateral angles. This frontal margin forms a very broad obtuse angle with its apex in the median line. On either side of this apex to the antero-lateral angle this portion of the head is somewhat depressed. The antennæ are not conspicuous, lying concealed beneath the frontal margin of the head. The first pair extends to the posterior angle of the first thoracic segment; its flagellum contains ten articles. The second pair reaches the middle of the second segment; its flagellum is twelve-jointed. The eyes are dorsally situated on the posterior half of the head.

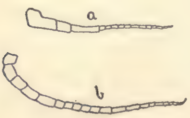

Fig. 10.—*a*, Antenna of 1st pair; *b*, Antenna of 2d pair. × 5⅔.

The thoracic segments are about equal in length. The first one extends laterally around the posterior portion of the head, forming a broad plate at the side of the segment. The epimera of all the segments are about twice as broad as long, with the exception of those of the fifth segment, which are nearly square and very conspicuous.

The first segment of the abdomen has three suture lines, and its posterior margin projects down at the sides over the terminal segment. The terminal segment is triangular, and has a very pointed extremity. The uropods differ considerably. The inner one is broad and tapering, and does not reach the tip of the abdomen. The outer one is slender and sharply pointed, and extends beyond the abdomen.

The first pair of legs are subchelate, as are also the second pair. In the first pair the propodus is large and oval in shape, and bears in the palma a row of stiff bristles at regular intervals and pointing obliquely in the same direction, while a thick row of fine cilia, pointing obliquely in the opposite direction, cross these almost at right angles. The dactylus terminates in a single hook, at the base of which two smaller hooks are situated. In the legs of the second pair the propodus is irregular in shape with an indication of a rudimentary

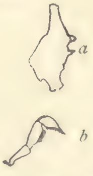

Fig. 11.—*a*, Mandible; *b*, Mandibular appendage. × 5⅔.

pollex. There are no hairs or bristles in the palma. The legs of the third, fourth, and fifth pairs present nothing unusual in structure, but resemble the ambulatory legs common to this family. In the sixth and seventh pairs the structure is the same as that of the preceding legs of the third, fourth, and fifth pairs, but with an increasing disproportion in the length of the propodus and dactylus. In the seventh pair of legs these joints, but more especially the propodus, attain a size most conspicuous for their length. The propodus becomes over 3½ times longer than the carpus which immediately precedes it.

Color.—The color varies from dark brown to yellow, more or less dotted with black. In the darker specimens the epimera and the uropods are almost white, with scattered spots of black. Other specimens are brown with markings of red, and some are bluish-gray in color tinged with brown or orange.

Type.—The type specimen was found at Station 3515, latitude 59° 59′ N., longitude 167° 53′ W., at a depth of 13 fathoms. Catalogue No. 20031.

Distribution.—This species extends all along the coast of Alaska, having been found at the following stations: Station 3272, north of Amak Island (31 fathoms); Station 3297, off Cape Menchikoff (26 fathoms); Station 3246, south of Hagemeister Island (17½ fathoms); Station 2841, North Head, Akutan Island (56 fathoms); Station 3248, off Bristol Bay (21 fathoms); Station 3600, on the coast of California (9 fathoms).

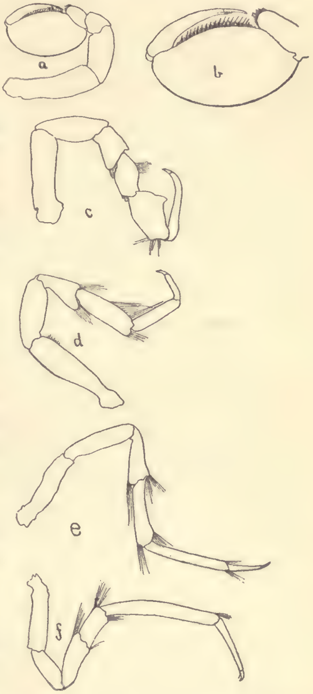

FIG. 12.—*a.* Leg of 1st pair. × 5⅔.
b. Last two joints of same. × 10⅔.
c. Leg of 2d pair. × 5⅔.
d. Leg of 3d pair. × 5⅔.
e. Leg of 6th pair. × 5⅔.
f. Leg of 7th pair. × 5⅔.

VOL. XI, PP. 185-187 JULY 1, 1897

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

DESCRIPTION OF A NEW *BASSARISCUS* FROM LOWER CALIFORNIA, WITH REMARKS ON '*BASSARIS RAPTOR*' BAIRD.

BY C. HART MERRIAM.

Among the mammals obtained on Espiritu Santo Island by Mr. J. E. McLellan, in August, 1895, are three specimens of *Bassariscus* belonging to an apparently undescribed species. The animal is decidedly smaller and grayer than *B. astutus flavus* Rhoads, its nearest known relative, and differs also in cranial and dental characters. It lives among the rocks near the beach, and is said to feed on crabs.

Bassariscus saxicola sp. nov.

Type from Espiritu Santo Island, Lower California. No. 79031, ♀ old, U. S. Nat. Mus., Biological Survey Coll. Collected August 19, 1895, by J. Ellis McLellan. Original No. 1438.

General characters.—Similar to *B. astutus flavus*, but smaller and grayer; tail more slender, with the black rings relatively broader.

Color.—Type specimen in summer pelage: Upper parts drab-brown, abundantly mixed along the back with black-tipped hairs; under parts pale ochraceous buffy; tail with 8 or 9 black rings, incomplete on under side; under side with 8 white triangles (the uppermost not well defined); ear: basal, $\frac{2}{3}$ dark; apical, $\frac{1}{3}$ whitish; top of head grizzled; sides of face marked by a dark patch between eyes and nose (including whiskers), and a larger, grizzled patch between eye and ear; cheek below eye and patch over posterior $\frac{1}{2}$ or $\frac{2}{3}$ of eye buffy.

Cranial and dental characters.—Skull similar to that of *B. astutus flavus*, but smaller; rostrum narrower; temporal impressions much nearer together; audital bullæ fuller anteriorly, their bases more abruptly rounded antero-externally; anterior nares reaching farther back superiorly; frontals more abruptly elevated above rostrum; postorbital processes more strongly developed; last upper molar decidedly smaller; upper carnassial with inner lobe more rectangular.

Measurements (type specimen).—Total length, 737; tail vertebræ, 370; hind foot, 60.

REMARKS ON BASSARISCUS RAPTOR (BAIRD).

Baird's type specimen of *Bassariscus raptor* was killed in the city of Washington, D. C., where it was killing poultry. That it had recently escaped from confinement was shown by the conspicuous collar-mark around its neck, which is still prominent in the dry skin. The specimen is now preserved in the National Museum, and was evidently first kept in alcohol and afterward skinned, as shown by the yellow discoloration of the pelage and by the puckered and hardened condition of the footpads.

I have compared both the skin and skull of this specimen with specimens from northern California and Oregon, and find that they agree closely in all respects, except the interpterygoid fossa, which is abnormally broad in the type specimen. The number and breadth of the black bands on the tail correspond with specimens from Oregon and northern California. The skull is a little larger than that of any Oregon specimen in the Department collection, but is almost exactly matched by a specimen from Glen Ellen, California.

Mr. S. N. Rhoads has renamed *Bassariscus raptor* (Baird), calling it *B. oregonus* (Proc. Acad. Nat. Sci., Philadelphia, 1893, p. 416), but I cannot see any way by which Baird's earlier name can be displaced by a more modern one, unless it can be proved that Baird's animal is not the form from the northwest coast, with which it agrees in every particular. There is a curious inconsistency in Mr. Rhoads' treatment of the species. On page 414 he says that the form from the northwest coast "may require to be varietally distinguished under the name *raptor* Baird, this name doubtless referring to the Pacific coast form, as already explained." Two pages later (p. 416) he says, "the small dark coast form from northern California northward (not of central and southern California) should be made a subspecies of *flavus*. In that case it should be called *Bassariscus flavus oregonus*."

It is of course unfortunate that the type locality of Baird's specimen is not positively known, but Baird's repeated statement that it probably came from California was doubtless based on some information which he did not at the time care to publish; and the fact that the characters of the specimen, both external and cranial, agree with those of the northwest coast animal, leaves little doubt as to the general locality whence the animal came.

Skulls of *Bassariscus* from Oregon and the coast region of northern California differ from those of the Texas animal in several respects, but the differences are not absolutely constant.

The teeth average smaller, particularly the fourth upper premolar, the crown of which is of the same length as the transverse diameter of the crown of the first upper molar (measured from the notch on the outer side). In Texas specimens the carnassial is usually but not always considerably longer.

In the Oregon animal the postpalatal notch cuts the plane of the last molar, while in the Texas animal it falls short of this plane. The inferior lip of the infraorbital foramen is slightly cut away, so that the foramen may be seen when the skull is looked at from below at right angle to the eye. In the Texas animal the foramen cannot be seen from below, but is distinctly visible from above, while in the Oregon animal it cannot be seen at all from above. This seems like a trivial difference which no one would expect to be constant, but as a matter of fact it is consistently constant in the four skulls of *raptor* examined. In the Oregon animal the postorbital constriction is deeper and the interorbital breadth somewhat less than in *B. a. flavus.*

VOL. XI, PP. 189-212 JULY 1, 1897

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

NOTES ON THE CHIPMUNKS OF THE GENUS *EUTAMIAS* OCCURRING WEST OF THE EAST BASE OF THE CASCADE-SIERRA SYSTEM, WITH DESCRIPTIONS OF NEW FORMS.

BY C. HART MERRIAM.

Owing to the unfortunate delay in bringing out the first volume of the Death Valley Expedition report, it is thought desirable to publish at once certain descriptions and remarks on Chipmunks that were written for this report in 1893. With these have been incorporated additional notes, and descriptions of two new species, obtained during subsequent explorations by the Biological Survey, both in the area covered by the original expedition and in adjacent territory on the north.

It will be observed that the name *Eutamias*, proposed by Trouessart in 1880* as a subgenus of *Tamias*, is here adopted as a full genus. This is because of the conviction that the superficial resemblance between the two groups is an accidental parallelism in no way indicative of affinity. In fact, the two groups, if my notion of their relationships is correct, had very different ancestors—*Tamias* being an offshoot from the ground

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*Catal. Mamm. Viv. et Foss., Rongeurs, 86, 1880. As originally proposed the name included four very different animals: *asiaticus* Gm., *harrisi* Aud. & Bach., *lateralis* Say, and *lævidens* Cope (fossil). The fossil *lævidens* I have not seen, but *harrisi* was placed by me in *Ammospermophilus* in 1892, and *lateralis* is the type of a very distinct subgenus of *Spermophilus*, which I here name *Callospermophilus*. The type of *Eutamias* was fixed on *Tamias asiaticus* Gm. by Allen in 1894 (Proc. Linn. Soc. N. Y., p. 26, July, 1894).

squirrels of the subgenus or genus *Ictidomys* Allen, and *Eutamias* from those of the subgenus or genus *Ammospermophilus* Merriam.

The substance of the present preliminary paper may be conveniently arranged under the following headings:

1. *General remarks on distribution.*
2. *Seasonal changes in pelage.*
3. *List of species and subspecies.*
4. *Remarks on the townsendi group (with keys).*
5. *Remarks on the speciosus group.*
6. *Note on Tamias quadrimaculatus Gray.*
7. *Descriptions of new species and subspecies.*

1. GENERAL REMARKS ON DISTRIBUTION.

There are no Chipmunks in the Sonoran deserts of the western United States, but the vast sage-brush plains of the central and northern parts of the Great Basin are inhabited by a small grayish species (*Eutamias pictus*), and other species live in the higher mountain ranges. On reaching the eastern base of the Sierra Nevada in California, and of the Cascade range in Oregon and Washington, one enters the region where the genus *Eutamias* attains its highest development. Excepting the great interior valley of California and one or two small valleys in southwestern Oregon, which are not inhabited by any Chipmunks, the strip of territory included between the east base of the Cascade-Sierra system and the Pacific Ocean may be said to be fairly overrun by these animals, containing not less than 14 species and subspecies. The chaparral-covered hills of southern California and the lower slopes of the mountains that surround the Mohave Desert and the great San Joaquin Valley have only a single species; but the boreal forests that clothe the higher mountains and practically the whole of western Oregon and Washington are the homes of a large number of forms belonging to three or four distinct groups. In the forests west of the Cascade Mts. only a single species occurs (*E. townsendi*), except along the extreme southwestern coast of Oregon, where it is replaced by an allied form (*E. ochrogenys*). On the eastern slopes and higher parts of the Cascade Mts. two species are found together—the small *E. amœnus*, which extends southward on the Sierra Nevada to about latitude 37°, and the large *E. townsendi*, which inhabits the Cascades from British Columbia southward to a point between latitude 44° and latitude 45°, and is then replaced by *E. senex*, which ranges thence southerly to the headwaters of the Merced, a little south of latitude 38°.

But it is in the Sierra Nevada of California that the genus *Eutamias* reaches its most extraordinary development. On both slopes of this lofty range species of Chipmunks are distributed in belts, one above the other, corresponding with the strongly marked life zones of the slopes. In most parts of the Sierra two species occur together, in some localities three, and in a small area near timber-line in the Yosemite National Park probably four. Since in following the Sierra northward the Boreal zones come lower and lower down, so certain Chipmunks which in the southern part are found only at high altitudes descend in the north till they reach base level at the upper end of the Sacramento Valley.

In crossing the High Sierra between Owens Valley and Fresno one traverses in a distance of only 50 miles the ranges of at least seven very distinct Chipmunks, as follows: On beginning the climb in Owens Valley one finds in the sage-brush the ordinary Great Basin species, *E. pictus;* a little higher up, in the nut pine belt, the most beautiful species of the genus, *E. panamintinus.* Then on entering the Boreal Zone he encounters two very distinct species, *E. amœnus* and *E. speciosus.* Still higher, in the neighborhood of timber-line, he sees for the first time the little Alpine Chipmunk, *E. alpinus*, and a little farther north the large *E. senex.** On descending the west slope he passes through the zone inhabited by *E. callipeplus*, a strikingly beautiful member of the *speciosus* group, and on the lower slope enters the belt in which *E. merriami* is the sole representative of the genus. If the section were made as far north as the Yosemite National Park, two others would be added, *E. senex*, along the summit of the range, and the superb *E. quadrimaculatus*, at lower altitudes on the west slope.

A good deal of work remains to be done in determining the exact boundaries of the areas inhabited by each species, but enough is already known to show that the group presents some very interesting peculiarities of distribution. For instance, *Eutamias alpinus* is distinctly an animal of the Hudsonian Zone of the southern High Sierra, and does not reach so far north as Lake Tahoe. *E. amœnus*, on the other hand, is not found so far south as Mt. Whitney, but begins apparently in the latitude of Independence Creek, and ranges thence northward to British Columbia. True *speciosus* seems to be restricted to the east crest of the High Sierra and the San Bernardino and San Jacinto Mts. on the other side of the Mohave Desert.* In the mountains about Lake Tahoe it is replaced by a closely related form, *E. frater*, which does not reach northern California. The large *E. senex* begins near the headwaters of the Merced in the Yosemite National Park and extends northward over the Sierra and eastern slope of the Cascades to a point in Oregon between latitude 44° and latitude 45°, where it is replaced by *townsendi*. *E. townsendi* continues northerly to British Columbia, and on the west side of the mountains reaches southward nearly to Rogue River. South of the mouth of Rogue River it is replaced by an allied form, *E. ochrogenys*, which follows the coast southward almost to San Francisco Bay. This form is restricted to the narrow coast strip known as the 'redwood belt.' Immediately east of this belt its range abuts against that of *E. hindsi*, which latter animal is replaced in the coast ranges south of San Francisco Bay by the allied *E. merriami*. *E. merriami* not only inhabits the coast ranges from San Francisco Bay south to the Santa Ynez Mts., but pushes on in a southeasterly direction along the San Gabriel, San Bernardino, and San Jacinto Mts. to the Cuyamaca Mts., and northeasterly by way of Mt. Piños and Tehachapi Mt. to the west slope of the Sierra, which it follows northward along the lower slopes as far at least as the Yosemite National Park.

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* Whether or not *E. alpinus* and *senex* actually occur together is not known. *E. amœnus* was not collected by the Death Valley Expedition south of Independence Creek.

2. SEASONAL CHANGES IN PELAGE.

The seasonal color changes in the genus *Eutamias* are startling, the difference in most species between the gray winter coat and the 'red' or bright golden-fulvous post-breeding pelage being almost incredible. In fact, in some instances, the same animal in different pelages has been named as two different species.

Dr. J. A. Allen, in his elaborate and admirable paper on the Chipmunks,† has pointed out the striking color change that takes place at the close of the breeding season, and in his detailed descriptions of the various species and subspecies has treated the 'breeding' and 'post-breeding' pelages under separate headings; but he remains silent as to what the worn breeding pelage was before it became worn, leaving it to be inferred that it was the left-over summer pelage of the preceding year. In fact, he speaks of only a single molt—that from the worn to the new summer pelage—which commonly takes place in June or July. There is, however, a second complete molt in the fall, usually in September or October, which results in a change of color hardly less remarkable than that of the summer molt. In general terms it may be said that while the change from the breeding to the post-breeding pelage results in a brightening of the tints, with a great increase in the fulvous or tawny colors, the change from summer to winter pelage is the reverse—the bright tawny colors giving place to rich grays and browns. The character of the pelage differs also, the summer coat being relatively short and hispid, while the winter coat is long, full, and woolly.

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* For interesting facts respecting the distribution of members of the *speciosus* group, see pages 199–201.

† Bull. Am. Mus. Nat. Hist., New York, vol. III, No. 1, pp. 45–116, 1890.

A remarkable circumstance connected with the change of pelage is that while the winter coat is worn about 9 months, the summer coat is worn only about 3 months, and in some cases for a considerably shorter period. The animals breed while still in the left-over winter pelage, which in early summer is often so worn and faded that it has the appearance of another pelage. In fact, although there are only two molts, it would not be amiss to describe 3 pelages: (1) the fresh fall or winter pelage; (2) the worn summer or breeding pelage [= the left-over winter pelage], and (3) the bright fresh reddish post-breeding pelage.

The change from the summer or 'post-breeding' pelage to the winter coat takes place by complete molt, as in the case of the change from the breeding to the post-breeding pelage; but there is a radical difference, at least in some species, in the way the molt progresses. At the close of the breeding season the animal is usually in worn, shabby pelage, and not infrequently the hairs are worn off so short that the dorsal stripes disappear. The new coat appears in irregular patches,* usually beginning on the head and covering the anterior half of the back next; in other words, while somewhat irregular, it progresses from before backwards. The late fall molt, on the contrary, begins on the rump and progresses from behind forward, the new hairs coming in uniformly and not in irregular patches as in summer molt. The winter molt succeeds the summer molt so soon that the summer pelage has not had time to become much worn; consequently, at this season, such shabby specimens as those commonly found at the end of the breeding season are unknown.

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*In some specimens the post-breeding pelage seems to creep in insidiously without the usual 'patchy' stage.

3. List of Chipmunks of California and of Western Oregon and Washington, with Type Localities.[*]

1.	*Eutamias pictus* (Allen)	Kelton, Utah.
2.	*alpinus* (Merriam)	Mt. Whitney, California.
3.	*amœnus* (Allen)	Fort Klamath, Oregon.
4.	*panamintinus* (Merriam)	Panamint Mts., California.

Speciosus group:

5.	*Eutamias speciosus* (Merriam)	San Bernardino Mt., California.
6.	*frater* (Allen)	Donner, California.
7.	*inyoensis* nob.	White Mts., California.
8.	*callipeplus* (Merriam)	Mt. Piños, California.

Intermediate between speciosus and townsendi groups:

9.	*Eutamias quadrimaculatus* (Gray)	Michigan Bluff, California.

Townsendi group:

10.	*Eutamias senex* (Allen)	Donner, California.
11.	*townsendi* (Bachman)	Lower Columbia River, Oregon.
12.	*ochrogenys* nob.	Mendocino, California.
13.	*hindsi* (Gray)	Near San Francisco, California.
14.	*merriami* (Allen)	San Bernardino Mt., California.

4. Remarks on the townsendi Group.

Eutamias townsendi and its relatives are the largest and darkest members of the genus. They inhabit the Pacific coast region from southwestern British Columbia (Westminster and the Mt. Baker range) southward to the Cuyamaca Mts. in extreme southern California; and if, as seems probable, *E. obscurus* is a member of the same series, the range will be extended to San Pedro Martir Mt. in Lower California. No member of the group is known from any point east of the east base of the Cascade-Sierra system. The group comprises five forms, all but one of which seem worthy of full specific recognition.* Three of the species are Boreal namely, *townsendi*, *ochrogenys*, and *senex*. The remaining two, *hindsi* and *merriami*, belong to the Transition and Upper Sonoran belts. The group may be thus subdivided into two series, the *townsendi* or Boreal series and the *hindsi* or Sonoran series. The principal characters of the five, with the geographic ranges of each, follow. Keys are given also, by means of which it is believed that specimens in any pelage may be referred to their proper species.

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[*] This list does not include the three new extralimital forms described in the present paper (*palmeri*, p. 208; *oreocetes*, p. 207; and *dorsalis utahensis*, p. 210).

Eutamias townsendi (Bachman). Townsend's Chipmunk.

General characters.—Under parts white at all seasons, moderately encroached upon by color of sides; general coloration uniform dull fulvous in post-breeding pelage, and uniform olive yellowish in winter pelage; post-auricular spots and ear stripes bluish gray, large and conspicuous; sides of face slightly washed with yellowish in winter pelage, more strongly washed with fulvous in post-breeding pelage; *five* dark dorsal stripes *black*, more or less obscured by fulvous or yellowish tipped hairs, but black always showing through; median dorsal stripe longer anteriorly than in any other species, always reaching to and often beyond anterior base of ears; ant-orbital part of middle facial stripe obsolete as in *ochrogenys;* inner pair of light dorsal stripes in both pelages same color as general color of upper parts; outer pair yellower.

Range.—Northern Pacific coast region from the southwestern corner of British Columbia (Westminster, Mt. Lehman, Chilliwack, and Mt. Baker range) southward over the whole of western Washington and Oregon to the Rogue River Valley; eastward in the northern Cascades to the east base of the range (head of Lake Chelan); westward to the extreme coast. On the east slope of the Cascades *E. townsendi* crosses the Columbia River and pushes southward a little beyond Mt. Hood. A short distance farther south on this slope it is replaced by *E. senex*.

Eutamias townsendi ochrogenys Merriam. Redwood Chipmunk.

General characters.—Under parts *never white*, but encroached upon by color of sides in ordinary pelage, and strongly washed with salmon-ochraceous in post-breeding pelage; sides of face suffused with ochraceous in all pelages; post-auricular spots bluish gray, large and conspicuous; anterior part of eye stripe obsolete. (For full description see p. 206.)

Range.—A narrow strip along the coast of southern Oregon and northern California, from near the mouth of Rogue River in Oregon to Cazadero, a short distance north of San Francisco Bay, in California.

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* It is an interesting fact that most, if not all, of the species have one pelage in which they resemble one pelage of one of the other species, while the other pelage is always distinctive. In some instances it is the winter pelage, in others the post-breeding pelage that is distinctive.

Eutamias senex (Allen). Allen's Chipmunk.

General characters.—Tail rather short, narrow, and pale fulvous underneath and at base of hairs on upper side; under parts white in both pelages; ear stripes and post-auricular spots sharply defined and conspicuous; general color of upper parts in winter pelage *gray*, in summer *fulvous*, except on head and rump; outer pair of light stripes whitish, inner pair grizzled grayish, in post-breeding pelage obscured anteriorly by fulvous; top of head and *rump grizzled grayish in all pelages*, only slightly more fulvous in post-breeding pelage; ant-orbital part of middle facial stripe only slightly marked; sides of face never suffused with yellowish; dark dorsal stripes obscured by fulvous, the black showing through, particularly on the median stripe.

Range.—The Sierra-Cascade system from Farewell Bend on the Des Chutes River in Oregon south to the headwaters of the Merced River in Yosemite National Park. In Oregon *senex* follows the east slope of the Cascade range down to base level, being common at Fort Klamath, as well as at similar elevations farther north. It occurs also at the Paulina Lakes, in the Paulina Mts., which range is connected with the main body of the Cascades by continuity of Boreal forest. The species was found at Prospect, in the Upper Rogue River Valley, and is common also in the Siskiyous along the boundary between Oregon and California. In the Sierra Nevada of central California it is confined to high altitudes, and does not approach base level on either slope. East of the Sierra proper, in Lassen Co., it inhabits the Big Valley Mts.*

Eutamias hindsi (Gray). Hinds' Chipmunk.

General characters.—General coloration redder than in any other member of the *townsendi* series; under parts white, except in post-breeding pelage, when they are faintly washed with fulvous; ear stripes and post-auricular spots fairly well defined, more conspicuous than in *merriami*, but much less conspicuous than in *townsendi* or *ochrogenys;* general color of upper parts in winter pelage grizzled grayish and dull fulvous; in summer pelage intense ferruginous anteriorly and on sides, becoming pale posteriorly. In winter pelage the dark dorsal stripes, except the median one, are obscured by fulvous, but in post-breeding pelage there are always three distinctly black dorsal stripes, and in some specimens the black shows through in the external lateral stripe. The outer light stripe is whitish, more or less suffused with yellowish in summer pelage; in winter pelage it is bluish gray. In winter pelage the fulvous is most marked on the lateral dark stripes which enclose the outer pair of light stripes, so that the striped effect is much more pronounced in winter pelage than in

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*The form from the Big Valley Mts. differs from typical *senex* in having the post-auricular patches and outer pair of light stripes much *whiter*. It is evidently not an intergrade between *senex* and *quadrimaculatus*, but may be regarded as an incipient subspecies, not yet requiring a name.

post-breeding pelage. The hairs of the upper side of the tail have a broad median band of fulvous which shows through in both pelages, giving the tail a rich fulvous glow not present in the other members of the series except—and to a less extent—in *townsendi* in post-breeding pelage.

Range.—Wooded or brushy hills of northern California west of the Sacramento Valley and north of San Francisco Bay. Northern limit of range unknown. Specimens have been examined from Nicasio northward to Sherwood, Cahto, and the head of Eel River. On the west the range of *hindsi* joins that of *ochrogenys.*

Eutamias merriami (Allen). Merriam's Chipmunk.

General characters.—Tail very long; ear stripes and post-auricular spots not sharply defined and not conspicuous; under parts white; general color of upper parts grayish in winter pelage, fulvous in summer pelage; outer pair of light stripes whitish and always conspicuous; dark dorsal stripes obscured by fulvous-tipped hairs, the median one only showing any clear black; sides of face never washed with yellowish or ochraceous; median facial stripe continuous in front of eye, usually dusky, bordered on both sides by fulvous; inner pair of pale dorsal stripes grizzled grayish.

Range.—Brush-covered slopes of the Upper Sonoran and Transition zones in southern California from the Cuyamaca, San Jacinto, and San Bernardino Mts. northward in the coast ranges to San Francisco Bay, and along the west slope of the Sierra to the Yosemite Valley. In the San Bernardino Mts. *merriami* occurs as far west as Wilson Peak, beyond which it is separated by a considerable gap from Mt. Piños, where it is abundant. Owing to the low altitude it inhabits, its range is practically continuous around the southern end of the San Joaquin Valley, specimens having been collected on Tehachapi Mt. and at Havilah near Walker Basin. The colonies inhabiting the Cuyamaca, Smith, San Jacinto, and San Bernardino Mts. are isolated. The form inhabiting the coast strip between Santa Cruz and San Francisco Bay is a little more highly colored than the typical animal, and has been named *pricei.*

KEY TO MEMBERS OF TOWNSENDI GROUP IN ALL PELAGES.

- Ear stripes and spot behind ear well defined; tail not exceedingly long.
  - *Under parts white* (not washed with fulvous).
    - Upper parts (excepting stripes) of *uniform* color from post-auricular spots to tail.
      - Color yellowish olive-gray (winter pelage) or dull yellowish fulvous (post-breeding pelage)....... *townsendi.*
    - Upper parts *not* of uniform color.
      - Rump grizzled gray; tail small, narrow, dull fulvous below. .... *senex.*
      - Rump grizzled golden-brown; tail large and bushy, deep chestnut below.................... *hindsi.*

- *Under parts not white* (washed with fulvous).
  - 3 dorsal dark stripes black; stripe from nose to ear distinct; side of face not suffused with yellowish (summer pelage)................................*hindsi.*
  - 3 dorsal dark stripes not black; stripe from nose to ear absent; sides of face strongly suffused with yellowish..*ochrogenys.*
- Ear stripes and spot behind ear not well defined; tail exceedingly long..*merriami.*

Key to Members of Townsendi Group in Ordinary Pelage.

- Tail exceedingly long; ear stripes and post-auricular spots indistinct.
  - General color grayish....................................*merriami.*
- Tail not exceedingly long; ear stripes and post-auricular spots conspicuous.
  - Rump and general ground color *clear light gray;* dark stripes rusty; flanks bright ochraceous fulvous...............*senex.*
  - Rump and general ground color *not gray;* dorsal stripes not rusty (except in *hindsi*).
    - Under parts suffused with fulvous and strongly encroached upon by color of sides; sides of throat and face strongly suffused with fulvous.
      - General color rich dark grizzled olive-gray.......*ochrogenys.*
    - Under parts white, not encroached upon by color of sides; sides of throat not suffused, and face only slightly suffused with fulvous.
      - General color *uniform* yellowish olive-gray, including flanks and rump; all 5 dark stripes showing more or less black; outer pair of light stripes *broad,* pale yellowish, becoming grayish with wear....................................*townsendi.*
      - General color *not* uniform and *not* yellowish olive gray; flanks bright fulvous, becoming pale with wear; dorsal stripes rusty, the median one (and sometimes the inner lateral pair) showing black along middle; outer pair of light stripes narrow, whitish......................................*hindsi.*

Key to Members of Townsendi Group in Reddish Post-breeding Pelage.

- *Tail exceedingly long.*
  - Ear stripes and post-auricular spots not sharply defined; outer pair of light stripes whitish; inner pair grizzled gray..*merriami.*

Tail not exceedingly long.

Upper parts with *at least 3 dorsal stripes distinctly black.*

Ground color of upper parts (including flanks and inner pair of light stripes) *uniform* dull yellowish fulvous from neck to tail; outer pair of light stripes slightly yellower and very broad; external lateral dark stripe showing black (making 5 stripes showing black); ear stripes and post-auricular spots sharply defined and very conspicuous.................... *townsendi.*

Ground color of upper parts *not* uniform; flanks and fore part of back rich ferruginous; outer pair of light stripes whitish, more or less washed with fulvous, and narrow; external lateral stripe rusty; ear stripe and post-auricular spots only moderately defined... *hindsi.*

Upper parts with *only one dorsal stripe* (*the median*) *distinctly black.*

Top of head and rump grizzled gray; outer pair of light stripes whitish; inner pair grizzled gray; *under parts white;* under side of tail *dull fulvous*............. *senex.*

Top of head and rump grizzled fulvous or golden-fulvous; outer pair of light stripes grizzled grayish, inner pair yellowish-fulvous; *under parts strongly suffused with salmon-fulvous;* under side of tail *deep rich chestnut*................................ *ochrogenys.*

5. REMARKS ON THE SPECIOSUS GROUP.

The *speciosus* group is of hardly less interest than the *townsendi* group, from which it differs totally in appearance. The members of the *townsendi* series are large and dark, with relatively dull stripes; those of the *speciosus* series are decidedly smaller and lighter, with very bright stripes. Most members of the *townsendi* group have become differentiated into full species, while those of the *speciosus* group (except *palmeri*, which is separately described) are still only subspecies. The *townsendi* group, as already shown, has both Boreal and Transition representatives; those of the *speciosus* group are purely Boreal, inhabiting the Hudsonian and Canadian zones from timber-line down to the lower limit of spruce and firs. Their distribution therefore is not continuous, but takes the form of isolated colonies occupying the summits of the higher mountains from San Jacinto Peak, in southern California, northward to the neighborhood of Donner, a little north of Lake Tahoe. The exact northern limit is unknown, but the group does not reach the mountains of northern California. The mountains on which members of the group are known to occur are San Jacinto, San Bernardino, Mt. Piños, the Inyo and White Mts., and the High Sierra. The type locality of the species is Mt. San Bernardino, and the typical form occurs also on San Jacinto Peak, and on the eastern crest of the southern part of the High Sierra in the neighborhood of Mt. Whitney. Owing to the high altitudes it inhabits, its range is nowhere continuous except in the High Sierra.

Curiously enough, the northern form in the Sierra (neighborhood of Donner and Lake Tahoe) differs very appreciably from typical *speciosus* and may be known as subspecies *frater* (Allen).

The form from the White and Inyo Mts. is also subspecifically separable and may be known as *inyoensis* nob.

The form inhabiting the summit of Mt. Piños is still different and may be known as subspecies *callipeplus* (Merriam). A closely related form, differing so little that it is included under the same name, inhabits the western crest of the southern Sierra.

In studying the distribution of these Chipmunks it is interesting to observe that with the single exception of Mt. Piños the mountains which encircle the west end of the Mohave Desert are too low to furnish a home for any member of the group, so that the colony of subspecies *callipeplus* inhabiting Mt. Piños is separated widely not only from the nearest colony of typical *speciosus*, but also from the nearest part of the range of the Sierra colony of its own subspecies.

Recapitulating, it appears that there are four forms of *speciosus* which seem worthy of recognition by name: (1) *speciosus* proper, inhabiting the San Jacinto and San Bernardino Mts. and the eastern crest of the High Sierra from Olancha Peak and Mt. Whitney northward an unknown distance, but not reaching the headwaters of the San Joaquin river; (2) *callipeplus*, inhabiting the summit of Mt. Piños and the western slope of the Sierra from the headwaters of Tule river northward nearly to the Yosemite Valley; (3) *inyoensis*, inhabiting the higher parts of the Inyo and White Mts., and (4) *frater*, inhabiting the higher parts of the main Sierra in the Lake Tahoe region of central California.

It is difficult to understand why there should be three recognizable forms within a distance of 150 miles in the Sierra Nevada while two of these forms reappear on isolated mountains 100 and 150 miles south of the southernmost limit of their ranges in the Sierra. This seems the more remarkable since in the Sierra the two forms in question—*speciosus* and *callipeplus*—are separated, if at all, by a gap only 15 miles in width.

In view of these facts it is important to bear in mind that the southern part of the lofty Sierra is split lengthwise by the upper valley of Kern River into two parallel ridges, one of which (the eastern) is inhabited by true *speciosus*, the other (the western) by *callipeplus*. It should be remembered also that the Mt. Piños colony of *callipeplus* lies southwest of the Sierra colony, and that the San Bernardino Mt. colony of *speciosus* lies southeast of the Sierra colony of the same form. These facts, taken in connection with the close relationship of *speciosus* with *quadrivittatus* of Colorado, point to the former continuous range of the group across the south end of the Great Basin from the Rocky Mts. to the Sierra, San Bernardino Mt., and San Jacinto Peak; while the presence of a distinct form (*callipeplus*) on Mt. Piños at the extreme west end of the Mohave Desert and on the western range of the Sierra not only points to a former connection between the now separated colonies of this form by way of Tehachapi and the intervening low mountains, but also seems to show that the two existing colonies of true *speciosus* now separated by the Mohave Desert were never united—unless in very remote times—by continuity of range along the horseshoe of mountains which connect the San Bernardino range with the Sierra. These facts argue great antiquity for the *speciosus-quadrivittatus* type and seem to show that very little change has taken place during the many thousands of years that have elapsed since the climate was cool enough to admit of continuity of Boreal forest across what are now the torrid Sonoran deserts of eastern California, southern Nevada, and southwestern Utah. This view receives additional support from the large amount of differentiation undergone by the colonies of clearly derivative forms of these animals now stranded on isolated mountains within the area of former continuous range of *quadrivittatus-speciosus* across the southern part of the Great Basin. These forms are the subspecies *inyoensis* of the Inyo and White Mts., and the very distinct species *palmeri* of the Charleston Mts., both of which must have developed their distinctive peculiarities since the great change in climate took place. And it is interesting to note that the degree of differentiation of these forms is proportionate to the climatic isolation of their homes.

Characters of the 4 subspecies of Eutamias speciosus.

Eutamias speciosus (Merriam) is the smallest and shortest-tailed member of the series. In ordinary pelage it is the *grayest* of the group, and in all pelages the tail is *deep rich fulvous* above and below, and the fulvous of the upper surface is only partly hidden by the black tips of the hairs. The facial stripes are strongly marked and the post-auricular patches whitish and well defined.

Eutamias speciosus frater (Allen) is considerably larger than true *speciosus;* the fulvous of the sides (below the external-lateral stripe) is brighter and more extensive; the tail, particularly the upper side, is paler fulvous, the black tip is shorter, and the edges and tips of hairs on the upper surface are grayish instead of deep yellow.

Eutamias speciosus inyoensis (nob.) is about the same size as *frater* and has the longest tail of any member of the group. The black tip of the tail is short, like that of *frater*, but the fulvous of the upper side is much deeper and richer. The subspecies differs from all others in having the facial stripes less pronounced, the post-auricular patches indistinct, the back of the neck *largely gray*, the median dorsal stripe *black*, and the inner pair of light stripes grayish white. It agrees with *callipeplus* and differs from all the others in having the rump grizzled golden yellowish instead of gray.

Eutamias speciosus callipeplus (Merriam) is the largest of the group. It agrees with *inyoensis* and differs from all the others in the grizzled golden yellow (instead of gray) of the rump, and the unusual amount of bright rufous in the upper side of the tail. The whitish post-auricular patches are larger and more clearly defined, and the yellow edging of the tail more extensive than in any of the others. In the typical form (from Mt. Piños) the black tip of the tail is short; in the Sierra form it is long—and this is the only difference I am able to detect between the two colonies. We have no specimens from Mt. Piños in post-breeding pelage, but specimens in this pelage from the west slope of the Sierra differ from *frater* in the same pelage in having the post-auricular patches better defined; the dark facial stripes darker and sharper and the white ones whiter; the inner pair of light dorsal stripes more obscured by fulvous; the rump yellower; the ears longer; the tail larger and more bushy, edged with *deep yellow* instead of grayish or pale yellowish, with the upper surface very much deeper and richer fulvous. *Eutamias speciosus callipeplus* in post-breeding pelage resembles *E. quadrimaculatus* in corresponding pelage, but differs in smaller size, shorter ears, very much brighter tints; in smaller, grayer, and less sharply defined post-auricular patches; broader external white dorsal stripes; blacker ant-orbital part of eye stripe; and yellowish instead of hoary tips to the hairs on the upper side of the tail.

6. NOTE ON 'TAMIAS QUADRIMACULATUS' GRAY.

Eutamias quadrimaculatus (Gray). Long-eared Chipmunk.

Tamias quadrimaculatus Gray, Ann. & Mag. Nat. Hist., 3d ser., XX, 435, 1867; Allen, Bull. Am. Mus. Nat. Hist., III, 80-82, 1890.
Tamias macrorhabdotes Merriam, Proc. Biol. Soc., Wash., III, 25–28, Jan. 27, 1886; Allen, Bull. Am. Mus. Nat. Hist., III, 78–80, 1890.

The material necessary for the final determination of the status and interrelations of the large Chipmunks of the Sierra Nevada was collected by the Death Valley Expedition. The names that have been given to these species are *Tamias quadrimaculatus* Gray (1867), *T. macrorhabdotes* Merriam (1886), *T. merriami* Allen (1889), and *T. senex* Allen (1890). *T. merriami* is a very distinct species from the one under consideration, and need not be discussed in the present connection. (See p. 197.)

Tamias quadrimaculatus was described by Gray in 1867 from a specimen from Michigan Bluff on the west slope of the Sierra in Placer County, California. This specimen is in the red post-breeding pelage, as shown by the original description and by a note from Mr. Oldfield Thomas, published by Dr. J. A. Allen (Bull. Am. Mus. Nat. Hist., III, p. 82, June, 1890). The species was not recognized by Baird, and Allen, in his Monograph of the Sciuridæ (1877), gave it as a synonym of *townsendi.*

In 1886 I described, under the name *Tamias macrorhabdotes*, a long-eared and strikingly colored Chipmunk from Blue Cañon in the Sierra Nevada of central California. At this time no specimen of Gray's *quadrimaculatus* was available for comparison, the only specimen extant (the type) being in the British Museum. Subsequently I came in possession of a single specimen in rather poor pelage from Nevada City, California, which differed from the specimens of *macrorhabdotes* from Blue Cañon (the type locality) in having considerably smaller and less distinctly striped ears, smaller post-auricular spots, the shoulders, anterior half of the back, and flanks deeply suffused with intense ferruginous, and the hind feet of the same color, though duller. This specimen was correctly identified by both Doctor Allen and myself as Gray's *quadrimaculatus.* Owing to the differences just mentioned, Doctor Allen, in his revision of the species of the genus *Tamias*, concurred with me in admitting Gray's *quadrimaculatus* and my *macrorhabdotes* as different species.

In addition to the material available when Dr. Allen wrote his revision of the group, large series of specimens are now before me from the three localities involved, namely, Nevada City, Michigan Bluff (the type locality of *quadrimaculatus*), and Blue Cañon (the type locality of *macrorhabdotes*). The Nevada City specimens alone are sufficient to settle the question. Some of them have just attained the post-breeding or summer pelage; others are in the worn breeding pelage, and others still are immature. Those in the fresh summer pelage agree with the specimen above described from the same locality, except that the ears and post-auricular spots are decidedly larger. Specimens in worn breeding pelage, however, are quite different, having merely a suspicion of the rich rusty color on the back and shoulders, and the rusty of the hind feet much less pronounced. These specimens, in fact, agree with specimens of *macrorhabdotes* from Blue Cañon in corresponding pelage. Furthermore, to put the matter beyond dispute, a series of specimens was obtained by the expedition from Michigan Bluff, the actual type locality of Gray's *quadrimaculatus*. They were collected in the latter part of October by Mr. Vernon Bailey, and agree in every particular with October specimens from Blue Cañon, the type locality of *macrorhabdotes*. They agree also with the Nevada City specimens in breeding pelage, except that the colors are a little deeper, the coat being new instead of worn. It is obvious, therefore, that *quadrimaculatus* Gray and *macrorhabdotes* Merriam are one and the same animal—the former in summer, the latter in fall pelage.*

The much greater development of ferruginous on the original Nevada City specimen and on the additional specimens in summer pelage more recently obtained from the same locality is purely a seasonal character, pertaining to the short-lived summer pelage. The October specimens of '*macrorhabdotes*' then available for comparison were believed by both Doctor Allen and myself to be in the post-breeding or summer pelage, and therefore strictly comparable with the Nevada City specimen—the late fall or winter pelage not having been recognized at that time in this or any other species of the genus.

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* Doctor Allen states that he was at first inclined to regard the two as identical, and Mr. Oldfield Thomas, Curator of Mammals in the British Museum, who compared a Blue Cañon specimen with Gray's type, wrote on the back of the label: "Certainly identical with the type of *T. quadrimaculatus* Gr., which only differs by more yellowish and less sharply defined underside and more fulvous flanks and shoulders."—Bull. Am. Mus. Nat. Hist., III, June, 1890, 82.

The summer pelage is of very brief duration, and a reëxamination of the original Nevada City specimen (collected in October, 1872, by E. W. Nelson) shows that it had already begun to assume the winter pelage, which is fully developed on the tail and rump, the deep rusty back of the summer pelage remaining in sharp contrast. In August specimens from Nevada City the rusty of the back reaches farther posteriorly.

All of the original specimens from Blue Cañon described by me as *macrorhabdotes* and also those described later by Doctor Allen were collected in June and October—the latter in winter pelage, the former in breeding pelage, which is the winter pelage with the tips of the hairs worn off. Neither of us, as already remarked, had seen the summer pelage, though at that time we believed the October specimens to be in this pelage.

The original Nevada City specimen had abnormally short ears, and the ear stripes were indistinct and quite different from those of the original Blue Cañon specimens, the whole of the dark stripe, covering the anterior two-thirds of the ear, being obscured by rusty. Examination of the additional material now available shows that the full development of the ear stripes is a seasonal character and is only attained in the winter pelage. In this pelage the posterior third of the ear is clear blue-gray, sharply defined by a stripe of blackish which occupies the anterior two-thirds, and is margined with rusty in front only. In summer pelage the rusty spreads over the whole of the dark stripe, obscuring it and giving the ear a wholly different appearance. The outer pair of pale dorsal stripes is whiter in summer than at any other season.

The excessive length of the ears, which adds much to the remarkable appearance of the animal, is most pronounced in the Blue Cañon specimens. The ears are nearly as long in the Michigan Bluff specimens and only slightly shorter in those from Nevada City.

In some respects *Eutamias quadrimaculatus* seems to hold an intermediate position between *callipeplus* of the *speciosus* group and *senex* of the *townsendi* group, but in reality it is not intermediate. The particulars in which it differs from *callipeplus* have been stated (p. 202). In post-breeding pelage it resembles *senex*, but it differs from *senex* in the following points: ear larger and longer; white face stripe, ear stripe, post-auricular patches, and outer pair of white dorsal stripes whiter; dark facial stripes darker; tail more strongly fulvous, particularly on upper surface. In *quadrimaculatus* the lower cheek stripe is usually dusky, at least posteriorly, and reaches backward behind the plane of the ear; the post-auricular patches are larger than in *senex*, and are pure white instead of bluish gray; the eye stripe is usually blackish both behind and in front of the eye; the outer pair of dorsal stripes are almost as white as in *speciosus*, though not so broad.

The geographic range of *E. quadrimaculatus* is a narrow belt along the lower part of the west slope of the Sierra Nevada from the Yosemite National Park northward to Quincy, in Plumas County. In its relations to other forms, it lies below the range of *senex* and seems to replace *merriami* on the lower slopes north of the Yosemite.

7. Descriptions of New Species and Subspecies.

Eutamias townsendi ochrogenys subsp. nov. Redwood Chipmunk.

Type from Mendocino, California, No. 67182, ♂ ad., U. S. Nat. Mus., Biological Survey Coll. Collected July 17, 1894, by J. E. McLellan. Original No. 1015. (In change of pelage: anterior half of body in fresh post-breeding coat.)

General characters.—Size large; general coloration dark and rich; post-auricular spots and ear stripe bluish gray, large and conspicuous; *side of face ochraceous in all pelages;* color of sides *extending far down on underparts* except in post-breeding pelage when the under parts are *strongly washed with salmon-ochraceous;* ant-orbital part of middle dark facial stripe obsolete. Resembles *merriami* in corresponding pelages, but differs in uniformly darker coloration, more conspicuous ear stripes and post-auricular spots, presence of ochraceous suffusion on underparts and sides of face, and absence of ant-orbital part of middle dark face stripe. Differs from *townsendi* in all pelages by color of underparts, which is always white in *townsendi*, and by different colors of upper parts.

Color.—*Winter pelage* (in spring and early summer, before replaced by post-breeding pelage): upper parts rich olive, finely grizzled with gray and golden, and becoming dull fulvous on sides; dorsal dark stripes black, more or less obscured by fulvous-tipped hairs; inner pair of light stripes only faintly paler than general ground color of upper parts; outer pair of light stripes grayish; post-auricular spot and posterior ear stripe bluish gray and sharply defined; rest of ear dusky or blackish; becoming more and more fulvous as summer advances; sides of face, including stripes, suffused with ochraceous, increasing in intensity and area as the season advances; fore and hind feet olive gray slightly tinged with pale fulvous, the fulvous increasing in summer; tail above blackish with hoary tips; below rich chestnut with broad submarginal black band.

Post-breeding pelage: upper parts fulvous, brightest and richest on sides, becoming paler and duller on rump; dark dorsal stripes much redder than in winter pelage, the median one only showing any clear black; inner pair of light stripes also suffused with fulvous; outer pair grayish; face (sometimes including nose), anterior and inner part of ears, under parts, and fore and hind feet strongly suffused with fulvous.

Measurements.—Type specimen: total length, 261; tail vertebræ, 113; hind foot, 38. Average of 8 specimens from type locality: total length, 263; tail vertebræ, 115.5; hind foot, 38.5. Average of 18 specimens from Cazadero and Gualala, California: total length, 260.5; tail vertebræ, 111.6; hind foot, 38.5.

Remarks.—In post-breeding pelage *E. ochrogenys* assumes a fulvous pelage, which while differing conspicuously from the corresponding pelage of *hindsi* is very much more like *hindsi* in worm spring pelage. In fact, except for the dates on the labels it would be hard to tell from the color whether certain specimens were the redwood Chipmunk in post-breeding pelage or *hindsi* in spring pelage. Of course the post-breeding pelage is fresher and less worn, and carries with it a salmon-fulvous suffusion on the belly which is much less extensive in *hindsi.* In some specimens of *hindsi* in summer pelage the fulvous of the sides washes across the belly, but this wash is much less extensive and less intense than in the redwood animal. There is also a difference in the color of the upper parts, although this is sometimes hard to be sure of. The post auricular patches are whiter than in *hindsi*, and the inner pair of light stripes are more strongly suffused with yellowish. All of the stripes are shorter posteriorly, so that the unmarked area of the rump is more extensive than in *hindsi.*

Contrasting specimens in corresponding pelage, there is no difficulty in separating the two animals. *E. hindsi* in summer pelage is a very red Chipmunk, and the upper parts, particularly from the back of the neck to the lumbar region, are very bright rich fulvous. In *hindsi*, moreover, in post-breeding pelage the three dorsal dark stripes are *black*, and even the external lateral stripe is distinctly marked, though washed with fulvous. In the redwood animal the dark stripes are never black, and the external lateral stripe is nearly obsolete.

Eutamias oreocetes sp. nov. Timber-line Chipmunk.

Type from timber-line near Summit, Teton Mts. [main range Rocky Mts.], Montana. No. 72468, ♀ ad. (nursing). U. S. Nat. Mus., Biological Survey Coll. Collected June 14, 1895, by Vernon Bailey. Orig. No. 5024.

General characters.—In spring pelage similar in color and general appearance to *Eutamias minimus* and *alpinus*, which very distinct species bear a surprisingly close seperficial resemblance to one another; dorsal stripe longer, broader, and blacker than in either *minimus* or *alpinus*, in this respect resembling the larger *affinis* in spring pelage.

Color.—Type in spring pelage [= left-over winter pelage]: upper parts gray with a buffy yellowish suffusion on flanks and on side of neck just in front of foreleg; post-auricular spots whitish; top of head grizzled grayish, dorsal stripe from between ears to tail *black;* lateral dark stripes black, the hairs tipped with rusty; inner pair of pale stripes whitish; outer pair white; rump gray; feet whitish; tail above, grizzled buffy yellowish; below, pale fulvous with black submarginal band edged with buffy ochraceous.

Cranial characters.—The skull of *Eutamias oreocetes* is so much smaller than that of its geographical neighbor, *E. affinis*, that no detailed comparison is required. Contrasted with the skull of *E. alpinus* from the High Sierra of California, the skull is slightly larger, the frontals decidedly narrower between orbits; parietals longer; rostrum blunter and much more swollen; teeth disproportionally larger, especially the molars.

Measurements.—Type specimen, ♀ ad.: total length, 193; tail vertebræ, 90; hind foot, 31. *Cranial measurements:* basal length, 26; zygomatic breadth, 18; palatal length, 15.5; upper molar series on crowns, 5.

Eutamias speciosus inyoensis subsp. nov. Inyo Chipmunk.

Type from White Mts., Inyo Co., Calif. No. $\frac{29387}{41462}$, ♂ yg. ad. U. S. Nat. Mus., Biological Survey Coll. Collected July 7, 1891, by E. W. Nelson. Original No. 1069.

Geographic distribution.—Boreal summits of White and Inyo Mts., California.

General characters.—Similar to *E. speciosus*, but facial stripes less pronounced; post-auricular patches ill defined; rump grizzled golden yellowish instead of gray; middle dorsal stripe blacker; gray on back of neck more extensive; black tip of tail shorter.

Color.—Type (July 7): top of head grizzled grayish; dorsal stripe from between ears to base of tail black, faintly edged with rusty along middle of back; lateral dark stripes rusty anteriorly, becoming black edged with rusty on posterior half; outer pair of light stripes white; inner pair gray; sides, from in front of foreleg to rump, bright fulvous; back and sides of neck grayish white, the post-auricular spots indistinct; rump golden yellow, grizzled by black hairs; upper surface of hind feet fulvous; fore feet washed with pale fulvous; tail above, grizzled yellowish-ochraceous and black; below, fulvous with submarginal black band.

Measurements.—Type: total length, 225; tail vertebræ, 102; hind foot, 34. Average of 4 specimens from type locality: total length, 227; tail vertebræ, 100; hind foot, 33.3.

Eutamias palmeri* sp. nov. Palmer's Chipmunk.

Type from *Charleston Peak, Nevada* (altitude about 2450 meters or 8000 feet). No. $\frac{26075}{33481}$, ♂ ad., U. S. National Museum, Biological Survey Coll. Collected by T. S. Palmer and E. W. Nelson Feb. 13, 1891. (Original No. 432.)

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*Named in honor of Dr. T. S. Palmer, who was in command of the expedition during my absence, and who was in charge of the party that visited Charleston Peak and discovered the species.

General characters.—*Eutamias palmeri* resembles *E. dorsalis* in size and in the pallid grayish color of the upper parts in winter pelage, but differs in having the stripes more distinct, and in other particulars. In size it agrees very well with typical *quadrivittatus*, though the body is a little larger and the tail a little shorter, but it differs radically from *quadrivittatus* in coloration, resembling *panamintinus* much more closely, though differing in having the upper side of the tail black, and in other respects. Its real affinities are with the *quadrivittatus* group, as shown by cranial characters. The ears are rather small. The dorsal stripes are short at both ends, except the median one, which reaches the occiput. In the clear gray of the neck it resembles the pigmy *E. pictus*.

Color.—*Winter pelage:* upper parts gray; no fulvous on back of neck; flanks suffused with pale fulvous; light stripes hoary gray, the outer pair whitish; the three dark dorsal stripes pale ferruginous, the middle one blackish or umber along the median line; outer pair of dark stripes obsolete; facial stripes faintly developed, the lower (cheek) pair failing anteriorly; post-auricular spots dull whitish and not well defined; ear stripes distinct, the posterior dull bluish-white; the anterior dusky, edged along the anterior base with fulvous; feet grayish, faintly suffused with fulvous. Tail: upper side black for three-fourths its length (the base grayish), the extreme tips of the hairs on the base and sides (except the terminal part which is solid black) yellowish; under surface rufous, bordered with black, and edged on the sides only with yellowish.

Summer pelage unknown.

Cranial and dental characters.—Skull slightly larger than that of *quadrivittatus*, with larger audital bullæ, and larger and heavier molar teeth, both above and below. The lower premolar is longer and narrower anteriorly than in *quadrivittatus*, and the last lower molar is broader.

Measurements of type specimen (taken in flesh).—Total length, 219; tail vertebræ, 98; hind foot, 33. Average measurements of 13 specimens from type locality: total length, 219.3; tail vertebræ, 93.4; hind foot, 33.3.

General remarks.—Palmer's Chipmunk has one of the most restricted ranges of any known mammal, being confined to the boreal summit of Charleston Peak—a lofty isolated mountain in southern Nevada. This mountain is completely surrounded by arid deserts which prevent the spread of the species as effectually as an ocean. Though *Eutamias palmeri* bears points of resemblance to several species it is not closely related to any. Still it was evidently derived from the *quadrivittatus-speciosus* stock. The complete isolation of the mountain peak on which it lives sufficiently explains its peculiarities.

Dr. Palmer has given me the following memorandum respecting the place where his chipmunk was obtained. He says: "Thirteen specimens of this species were secured at an altitude of about 8,000 feet on the northwest side of Charleston Peak, where Mr. Nelson and I camped for two days, Feb. 12–14, 1891, in the bottom of a deep east and west cañon. At this time snow lay on the ground to the depth of a foot or more in the bottom of the cañon and covered the upper parts of the main ridge of the Charleston Mountains, but on the north slope of the cañon there was little or no snow. The timber in the cañon was composed mainly of yellow pines (*Pinus ponderosa scopulorum*), which formed a belt extending at least 1,000 feet above the altitude of camp. On the north side of the cañon *Pinus monophylla* and *Juniperus californica utahensis* were the characteristic trees and here reach their highest altitude, owing to the effects of slope exposure.

"The chipmunks were abundant during the warm part of the day, running along the logs and in open spaces on the sunny north side of the cañon. Nearly all the specimens were taken within a mile of camp. On the 13th of February an ascent was made of the main ridge northwest of Charleston Peak, but no chipmunks were seen more than 1,000 feet above the camp, doubtless owing to the snow and cold."

Eutamias dorsalis utahensis subsp. nov. Utah Cliff Chipmunk.

Type from Ogden, Utah. No. $\frac{4788}{5448}$, ♂ ad., Merriam Collection. Collected by Vernon Bailey Oct. 9, 1888. Original No. 289.

General characters.—Similar to *E. dorsalis*, but slightly smaller and paler, with all of the markings less distinct, particularly the post-auricular patches and facial stripes; under side of tail fulvous instead of rufous.

Color.—Winter pelage: Upper parts hoary buff, darker on the top of the head, which is grizzled from the admixture of rusty hairs, suffused with pale fulvous on the sides; post-auricular spots small, indistinct, and pale buffy; dorsal stripes nearly obsolete, the median only being noticeable in ordinary lights; facial stripes distinct, but pale and pallid contrasted with those of typical *dorsalis;* under side of tail fulvous, bordered with black and edged with yellowish.

Summer pelage: Similar, but paler and more hoary from bleaching of the old hairs. In the young all of the stripes are distinct.

Cranial characters.—The skull of subspecies *utahensis* differs from that of typical *dorsalis* in smaller size, conspicuously shorter rostrum, and smaller teeth. The length of the nasal bones is conspicuously shorter than the combined length of the basioccipital and basisphenoid. In *E. dorsalis* the length of the nasals equals or exceeds the occipital-sphenoid length.

Measurements of type specimen (taken in flesh).—Total length, 220; tail vertebræ, 97; hind foot, 33. Ear from notch, 16 (in dry skin). Average of 10 specimens from type locality: total length, 223.6; tail vertebræ, 102; hind foot, 32.9.

General remarks.—The type specimen of '*Tamias dorsalis*' Baird,* came from the Silver mines in the Mimbres or Piños Altos Mountains, about the sources of the Gila River in western New Mexico. Mr. Clark P. Streator was sent to the type locality late in November, 1892, and obtained 17 specimens in fresh winter pelage. The contrast between these specimens and the

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**Tamias dorsalis* Baird, Proc. Acad. Nat. Sci., Phila., VII, 332, 1855.

series of *utahensis* in corresponding pelage from the east base of the Wasatch Mountains in Utah is most striking. In typical *dorsalis* the post-auricular spots are white and much larger and more sharply defined than in *utahensis*. They are bordered below by chestnut, a continuation of the lower facial stripe. All of the facial stripes are broad, sharply defined, and highly colored. The under side of the tail is deep chestnut—in some specimens bright orange-rufous—instead of fulvous, as in *utahensis*. The upper parts also are somewhat darker. The difference between summer and winter pelages seems to be much greater in *dorsalis* than in *utahensis*. The two forms would undoubtedly have been separated before if any recent mammalogist had seen typical specimens of both; but until the present series was obtained from the type locality the typical form was practically unknown.

The difference in size between the two forms is marked, *dorsalis* being much the larger, as may be seen by reference to the accompanying average measurements of specimens from the type localities of both:

Average measurements of Eutamias dorsalis and E. dorsalis utahensis from type localities (measured in flesh).

Species.	Locality.	No. of specimens.	Total length.	Head and body.	Tail vertebræ.	Hind foot.
Eutamias dorsalis	Piños Altos Mts., N. Mex.	14	236.3	128.6	107.7	35.4
Eutamias dorsalis utahensis.	Foot of Wasatch Mts., near Ogden, Utah.	10	223.6	121.6	102	32.9

Eutamias dorsalis utahensis was obtained by the Death Valley Expedition in but a single locality, namely, the Beaverdam Mountains in the extreme southwestern corner of Utah, where several were seen in rocky places in the piñon belt at an altitude of 1200 to 1375 meters (4000–4500 feet). They were so shy that only one was secured, although Mr. Bailey and I spent several hours in watching the rock heaps into which they had disappeared.

Two years later (in 1893) I found the species in the so-called 'San Francisco' or 'Horn Silver' Mts., between the south end of Sevier Lake and the mining camp of Frisco, in southwestern Utah.

The Cliff Chipmunk (including both *E. dorsalis* and subspecies *utahensis*) is restricted so far as known to the Upper Sonoran and Transition Zones along the western and southern part of the Great Colorado Plateau and its outliers, where it ranges from the foot of the Wasatch Mountains in northeastern Utah southward as far as the Plateau extends in Arizona, and thence easterly to the Mimbres in the Piños Altos Mountains in western New Mexico. Apparently the range of *utahensis* is much more extensive than that of the typical form, since specimens from eastern Arizona are intergrades, and those from western Arizona and southeastern Nevada are nearly typical *utahensis.*

The name 'Gila Chipmunk,' commonly applied to *E. dorsalis* is a glaring misnomer, since it implies that the species inhabits the valley of the Gila, one of the hottest and most arid of the torrid Lower Sonoran Deserts. As a matter of fact it never enters this desert at all, but lives in a higher zone, under widely different conditions. The early use of the name Gila Chipmunk is due to the circumstance that the original specimen came from the mountains near the headwaters of the Gila River. Since the species always lives among rocks, and its favorite haunts are cañons and the faces of precipitous cliffs, the appropriate name *Cliff* Chipmunk is here given it in place of the old misleading one.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

DESCRIPTIONS OF EIGHT NEW POCKET GOPHERS OF THE GENUS *THOMOMYS*, FROM OREGON, CALIFORNIA, AND NEVADA.

BY C. HART MERRIAM.

Owing to unavoidable delay in the publication of my revision of the Pocket Gophers of the genus *Thomomys*, it is thought best to publish the following new species at once:

Thomomys nevadensis sp. nov.

Type from Austin, Nevada. No. $\frac{25001}{32413}$, ♂ yg. ad. U. S. Nat. Mus., Biological Survey Coll. Collected Nov. 11, 1890, by Vernon Bailey. Original No. 2097.

General characters.—Size large—largest of the genus after *T. bulbivorus.* Two color phases: pale buff and dark plumbeous slate. Skull suggesting that of *T. bulbivorus;* incisors curving far forward, tail of medium length.

Color.—Normal pelage: upper parts buff, pinkish buff, or buffy gray, becoming darker (sometimes dusky) on nose and around mouth; under parts whitish buffy, the plumbeous under fur showing through; fore and hind feet and tail whitish; ears and small post-auricular spot dusky. *Plumbeous pelage:* uniform slate color above and below, with irregular white patch on throat and inner side of cheek pouches; fore and hind feet and terminal part of tail (irregularly) white or whitish.

Cranial characters.—Skull large and heavy, only exceeded by that of *T. bulbivorus*, which it resembles in general characters except in the peculiar form of the pterygoids; zygomata widely spreading; squarely angular, the jugals essentially parallel; temporal ridges meeting in a low sagittal crest in old males; premaxillæ pushing far back behind nasals; pterygoids normal (not expanded and inflated as in *bulbivorus*); incisors projecting forward, but not so far as in *bulbivorus.*

Measurements.—Type specimen: total length, 275; tail vertebræ, 90; hind foot, 38.

Thomomys angularis sp. nov.

Type from Los Baños, Merced Co., California. No. 58123, ♂ ad. U. S. Nat. Mus., Biological Survey Coll. Collected Jan. 1, 1894, by J. E. McLellan. Original No. 418.

General characters.—Size medium; color grizzled fulvous, varying in intensity; skull similar in general to that of *T. fulvus*, but more massive, and differing in several characters; upper incisors moderately produced.

Color.—Upper parts fulvous, grizzled with black tipped hairs, which are most numerous on middle of back; top of nose and ears blackish; under parts plumbeous strongly washed with buffy ochraceous; fore and hind feet and tail whitish.

Cranial characters.—Skull large and massive; braincase broad; zygomata widely and squarely spreading; jugals parallel; temporal ridges meeting in old age; nasals emarginate posteriorly; interorbital region rounded; angular process of mandible expanded and produced. The skull of *T. angularis*, contrasted with that of *T. fulvus*, is heavier, with larger and more squarely spreading zygomata, more rounded interorbital part of frontals; approximating temporal ridges; larger pterygoids, much larger angular processes of under jaw, and more prominent incisors.

Measurements.—Type specimen: total length, 257; tail vertebræ, 75; hind foot, 32.

Thomomys mazama sp. nov.

Type from Crater Lake, Mt. Mazama, Oregon. Exact locality, head of Anna Creek; altitude, 6000 feet. No. 80502, ♂ ad. U. S. Nat. Mus., Biological Survey Coll. Collected Sept. 3, 1896, by E. A. Preble. Original No. 1485.

General characters.—Size rather small; color dull fulvous; similar to *T. monticolus* Allen, but somewhat darker and differing materially in cranial characters.

Color.—Upper parts from just in front of eyes to base of tail dull fulvous brown; under parts strongly washed with fulvous; nose, end of muzzle all round; small circle round eye; ear and post-auricular spot dusky; fore and hind feet and tail whitish.

Cranial characters.—Skull rather long and slender; similar to that of *T. monticolus* Allen, but audital bullæ decidedly larger; zygomata somewhat more spreading, and sulcus on inner side of upper incisor less marked.

Measurements.—Type specimen: total length, 214; tail vertebræ, 71; hind foot, 27.5. Average of 3 specimens from Crater Lake: total length, 214; tail vertebræ, 71; hind foot, 28.

Thomomys quadratus sp. nov.

Type from The Dalles, Oregon. No. 57134, ♂ ad. U. S. Nat. Mus., Biological Survey Coll. Collected Nov. 2, 1893, by C. P. Streator. Original No. 3359.

General characters.—Externally similar to *T. mazama* and *T. nasicus*, but with a totally different skull.

Color.—Upper parts from half way between eyes and nose posteriorly to tail, russet fulvous; under parts dark plumbeous, washed with salmon fulvous; nose, muzzle all round, and ear spot dusky; fore and hind feet and tail whitish, irregularly clouded with dusky.

Cranial characters.—Skull short and broad; zygomata abruptly and widely spreading, with anterior-external angle nearly square and jugals parallel; nasals rather short, broad, squarely truncate posteriorly, and early ankylosed together; temporal ridges distant, parallel; interparietal rather large and roughly oval; audital bullæ rather large; upper incisors not sloping forward.

Measurements.—Type specimen: total length, 220; tail vertebræ, 67; hind foot, 29. Average of 6 specimens from type locality: total length, 205; tail vertebræ, 64; hind foot, 27.

Thomomys leucodon sp. nov.

Type from Grant Pass, Rogue River Valley, Oregon. No. $\frac{32034}{43848}$, ♂ ad. U. S. Nat. Mus., Biological Survey Coll. Collected Dec. 17, 1891, by C. P. Streator. Original No. 1394.

General characters.—Similar to *T. laticeps* from Humboldt Bay, but smaller; under parts brighter fulvous; incisors white instead of yellow and sloping more strongly forward; all the teeth much smaller.

Color.—Upper parts from nose to tail dull fulvous brown, becoming brighter on sides and belly; nose, sides of mouth, and ear spots dusky [no dusky ring round eye]; fore and hind feet whitish; tail yellowish buff.

Cranial and dental characters.—Braincase broad; zygomata widely spreading; temporal ridges parallel, distant; interparietal rather large, shield shaped; skull similar to that of *T. laticeps* but smaller; nasals narrower and more deeply notched posteriorly; basi-occipital narrower; incisors sloping far forward, their anterior faces white (sometimes slightly stained with pale yellow), narrower and more rounded than in *laticeps.*

Measurements.—Type specimen: total length, 221; tail vertebræ, 68; hind foot, 29.

Thomomys operarius sp. nov.

Type from Keeler, Owens Lake, Inyo Co., California. No. $\frac{25054}{32466}$, ♂ ad. U. S. Nat. Mus., Biological Survey Coll. Collected Nov. 29, 1890, by E. W. Nelson. Original No. 1.

General characters.—Size small; color pale buffy; fore claws very long and slender; cranial characters peculiar. Does not require comparison with any known species.

Color.—Uniform buffy yellowish or buff gray (according to pelage) from end of nose to tail; post-auricular spots plumbeous; under parts plumbeous strongly washed with white; fore and hind feet and tail white.

Cranial characters.—Skull short, broad, and massive, with widely and squarely spreading zygomata, short and broad rostrum, broad interorbital region, and well marked temporal ridges (1–2 mm. apart in adults).

Measurements.—Type specimen: total length, 228; tail vertebræ, 67; hind foot, 30. Average of 14 specimens from type locality: total length, 217; tail vertebræ, 67; hind foot, 29.2.

Thomomys alpinus sp. nov.

Type from Mt. Whitney, High Sierra, California. Exact locality, Big Cottonwood Meadows (altitude, 10,000 feet), 8 miles SE. of Mt. Whitney peak. No. $\frac{30528}{42512}$, ♂ ad. U. S. Nat. Mus., Biological Survey Coll. Collected August 6, 1891, by B. H. Dutcher. Original No. 167.

General characters.—Size rather small; coloration dark; similar in general to *T. fulvus*, but fulvous tints much duller and paler; skull smaller and less angular.

Color.—Type (in pale pelage): upper parts between sepia and drab brown, suffused with very pale dull fulvous brown; nose and sides of mouth dusky, the dusky reaching up between eyes; ears dusky, but without distinct post-auricular spot; under parts plumbeous, strongly washed with ochraceous buff; throat, fore feet, and tail irregularly white; hind feet white. There is a very much darker pelage in which the tips of the hairs are russet brown.

Cranial characters.—Skull rather small, rounded; zygomata spreading; frontals broad and flat interorbitally; nasals rather short. The skull of *T. alpinus* differs from that of *T. fulvus* in smaller size, shorter and less angular zygomata, shorter nasals, more smoothly rounded braincase, and less pronounced temporal ridges.

Measurements.—Type specimen: total length, 228; tail vertebræ, 67; hind foot, 30. Average of 6 specimens from type locality: total length, 220.5; tail vertebræ, 63; hind foot, 30.2.

Thomomys nasicus sp. nov.

Type from Farewell Bend, Des Chutes River, Oregon. No. 79815, ♂ ad. U. S. Nat. Mus., Biological Survey Coll. Collected Aug. 4, 1896, by E. A. Preble. Original No. 1274.

General characters.—Similar to *T. mazama*, but slightly paler, and with distinctive cranial characters.

Color.—Upper parts from in front of eyes to tail uniform pale russet fulvous; under parts dark plumbeous, strongly washed with pale fulvous; nose and front of muzzle pale dusky; a dark spot around and behind ear; fore and hind feet and tail whitish.

Cranial characters.—Skull long and slender, similar to that of *T. mazama*, but rostrum longer; nasals exceedingly elongated; zygomata sloping strongly backward; audital bullæ very small; temporal ridges distant; interparietal large and transversely elongated.

Measurements.—Type specimen: total length, 214; tail vertebræ, 69; hind foot, 27.

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PROCEEDINGS

OF THE

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OVIS NELSONI, A NEW MOUNTAIN SHEEP FROM THE DESERT REGION OF SOUTHERN CALIFORNIA.

BY C. HART MERRIAM.

Mountain sheep were found by the Death Valley Expedition in several of the desert ranges of southern California and southern Nevada, where ten specimens were secured by Mr. E. W. Nelson. They were killed in the northern continuation of the Funeral Mountains, locally known as the 'Grapevine Range.' Compared with the well known Bighorn of the Rocky Mountains and Cascade-Sierra system, they are much paler in color, somewhat smaller in size, and have very much smaller molar teeth. Compared with *Ovis stonei* recently described by Dr. Allen, the contrast in color is even more marked; but the pattern seems to be the same, and the darkening of the under parts and legs is also a character of *stonei*. In the absence of necessary material for comparison it seems best to treat the new form as a full species.

The geographic range of the southern Bighorn is unknown, but it is probable that all of the sheep of the semi-barren desert ranges of Mexico and the southern United States, from Texas to California, belong to the present form.

It is a noteworthy coincidence that Mr. Nelson, who in northern Alaska discovered and named the northernmost American Sheep (*Ovis dalli*), should also secure, in the Sonoran deserts of California, the southernmost representative of the group. In view of these facts, it seems peculiarly appropriate that the new sheep should perpetuate Mr. Nelson's name, which I take pleasure in bestowing upon it.

Ovis nelsoni sp. nov.

Type from Grapevine Mountains, on boundary between California and Nevada, just south of latitude 37°. No. $\frac{28383}{40487}$, ♀ ad. U. S. Nat. Mus., Biological Survey Coll. Collected June 4, 1891, by E. W. Nelson. Original No. 942.

General characters.—Apparently similar to *Ovis stonei* Allen in pattern of coloration, but much paler; rump patch small and completely divided on median line; tail short and slender; molar teeth very small.

Color.—Upper parts, except rump patch, pale dingy brown; under parts and legs much darker, contrasting sharply with the white areas; inguinal region, hinder part of belly (narrowing to a point anteriorly some distance behind forelegs), inner aspect of thighs and posterior aspect of fore and hind legs, white.

Measurements (taken in flesh by collector).—Total length, 1280; tail vertebræ, 100; hind foot, 360; height at shoulder, 830. In the dry skin the rump patch measures about 190 in breadth by 150 in length (from apparent base of tail).

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

DESCRIPTIONS OF TWO NEW PUMAS FROM THE NORTHWESTERN UNITED STATES.

BY C. HART MERRIAM.

Felis hippolestes sp. nov.

Type from Wind River Mts., Wyoming (near head of Big Wind River). No. 57936, ♂ old. U. S. Nat. Mus., Biological Survey Coll. Collected in November, 1892, by John Burlingham.

General characters.—Size enormous; color reddish brown; skull and teeth large and massive; frontal region elevated; upper carnassial with well developed inner cusp.

Color.—Upper parts dull pale rufous brown, darkest along middle of back and on tail; tip of tail black; nose to eyes grayish brown; a pale patch over each eye; outer sides of legs and feet pale dull grayish fulvous; back of ears blackish; chin, lips (except dark patch at base of whiskers), throat, breast, under side of fore legs, inguinal region, and hinder part of belly soiled white; under side of tail grayish white.

Cranial and dental characters.—Contrasted with skulls of *Felis concolor* from Patagonia and Costa Rica, the skull of *F. hippolestes* differs in very much larger size (basal length 178, instead of 160 or less; zygomatic breadth 160, instead of 135 or less); frontal much more elevated and swollen; postorbital processes broader, shorter, more swollen, and more decurved;* nasals more angular (deflexed) with a pit in frontals over their apex; teeth uniformly larger; upper carnassial with well developed inner cusp; lower premolars much more swollen.

Measurements (from well made skin).—Total length, 2600; tail vertebræ, 930; hind foot, 270. *Cranial measurements:* basal length, 178; zygomatic breadth, 160; palatal length (from gnathion), 93; postpalatal length (basion to postpalatal notch), 98; occipito-sphenoid length, 65; breadth across postorbital processes, 84; interorbital breadth, 49.

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* In *F. concolor* of corresponding age (rather old) from Pacuare, Costa Rica, the frontals are flat, with relatively long, slender, and only slightly decurved postorbital processes.

Felis hippolestes olympus subsp. nov.

Type from Lake Cushman, Olympic Mts., Washington. No. 77973 ('♂'?) ad. U. S. Nat. Mus., Biol. Survey Coll. Collected April 18, 1896, by Thomas Hayes.

General characters.—Similar to *F. hippolestes*, but color very much darker; tail concolor to black tip (not grayish white below, as in *hippolestes*); whitish areas on under parts much more restricted and less white.

Color.—Upper parts dark rufous brown, darkest along middle of back and on tail; tip of tail blackish; nose to eyes dusky; whole top and sides of head dark except a pale spot over each eye; backs of ears black except posterior edge, which is grayish; lips (except blackish patch at base of whiskers), chin, and anterior part of throat white; neck dull fulvous, palest below; breast and inguinal region soiled whitish; under side of fore legs only lightly washed with whitish; tail dark all round—not grayish white below as in *hippolestes*.

Remarks.—The type, though fully adult, is very much smaller and has a much smaller skull than *F. hippolestes*. It is marked '♂,' but possibly this may be an error.

Measurements (from well made dry skin).—Total length, 2095; tail vertebræ, 775; hind foot, 260. *Cranial measurements:* basal length, 162; zygomatic breadth, 127; palatal length (from gnathion), 76; postpalatal length (basion to postpalatal notch), 85; occipito-sphenoid length, 60; breadth across postorbital processes, 71; interorbital breadth, 39.

VOL. XI, PP. 221-223 JULY 15, 1897

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

DESCRIPTIONS OF FIVE NEW RODENTS FROM THE COAST REGION OF ALASKA.

BY C. HART MERRIAM.

Microtus sitkensis sp. nov.

Type from Sitka, Alaska. No. 73839, ♂ ad. U. S. Nat. Mus., Biological Survey Coll. Collected August 3, 1895, by C. P. Streator. Original No. 4745.

General characters.—Similar in color and general appearance to *M. californicus* in corresponding pelage, but somewhat darker and more reddish brown; belly washed with pale buffy fulvous; ears smaller; tail rather short, upper side black. Cranial and dental characters distinctive.

Color.—Upper parts uniform grizzled brown, not conspicuously lined with black hairs, and with a distinct 'reddish brown' suffusion, especially on rump and neck, which is probably peculiar to late summer pelage; under parts plumbeous (without white), the belly washed with ochraceous buff; tail sharply bicolor, black above, white beneath; fore and hind feet and ankles dusky.

Cranial and dental characters.—Skull long and narrow, very broad interorbitally; braincase rounded (not angular); interparietal subtriangular and rather small; zygomata not spreading; audital bullæ large and rather elongated (not rounded); incisive foramina very narrow and slit like, falling far short of molars; teeth as in subgenus *Microtus;* first lower molar with 3 closed loops on inner side and 2 on outer side, the anterior loop with no external and only 1 internal salient angle.

Remarks.—While externally *Microtus sitkensis* resembles *M. californicus*, its cranial characters place it in a different group, along with the small *M. kadiacensis.*

Measurements.—Type specimen: total length, 155; tail vertebræ, 42; hind foot, 23. *Cranial measurements:* basal length, 25; zygomatic breadth, 14; palatal length, 13 [to incisor]; interorbital constriction, 4.2.

Microtus kadiacensis sp. nov.

Type from Kadiak Island, Alaska. No. 65827, ♀ ad. U. S. Nat. Mus., Biological Survey Coll. Collected Sept. 12, 1893, by B. J. Bretherton. Original No. 213.

General characters.—Similar to *M. sitkensis* in color and general appearance, but much smaller, somewhat paler, and under parts white instead of ochraceous buff; tail and ears rather short.

Color.—Upper parts uniform grizzled pale brownish with pale dull fulvous suffusion, not conspicuously lined with black hairs; under parts plumbeous, strongly washed with pure white; tail sharply bicolor, dusky above, white beneath; fore and hind feet grayish brown.

Cranial and dental characters.—Skull similar to that of *M. sitkensis*, but very much smaller; interparietal much more elongated transversely and narrower; audital bullæ very much smaller and narrower; postpalatal pits deeper; teeth essentially as in *sitkensis*, but first lower molar with only 2 completely closed loops on each side.

Measurements.—Type specimen, measured in flesh by collector: total length, 141; tail vertebræ, 23 [probably 33]; hind foot, 18 [probably 19 or 20]. *Cranial measurements:* basal length, 23.5; zygomatic breadth, 13.5; palatal length, 12.8; interorbital constriction, 3.8.

Microtus unalascensis sp. nov.

Type from Unalaska, Alaska. No. $\genfrac{}{}{0pt}{}{30772}{42672}$, ♀ im. U. S. Nat. Mus., Biological Survey Coll. Collected Aug. 13, 1891, by C. Hart Merriam. Original No. z.

General characters.—Similar to *M. kadiacensis*, but apparently somewhat darker; audital bullæ much shorter and more globular; front lower molar with two closed and two open loops on inner side, and two closed and no open loops on outer side.

Color.—(Specimen immature): Upper parts yellowish brown, darkest on head; under parts plumbeous washed with whitish; tail sharply bicolor, narrowly black above, broadly white below; fore and hind feet grayish.

Measurements.—Type specimen (not full grown): total length, 122; tail vertebræ, 28; hind foot, 19.

Remarks.—This species, which resembles *M. ratticeps* of Europe in the enamel pattern of the first lower molar, is closely related to *M. kadiacensis*, from which it may be distinguished at a glance by the much shorter and more globular audital bullæ and the pattern of $\overline{m\,1}$.

During the single night spent at Unalaska on my return from the Seal Islands, I caught several of these Voles along the edges of a small pond on the outskirts of the Aleutian village of Iluliuk. Unfortunately, all but one were eaten by Ravens shortly after daylight. The one secured had dragged the trap into the water and drowned out of reach of the Ravens.

Peromyscus sitkensis sp. nov.

Type from Sitka, Alaska. No. 73809, ♂ ad. U. S. Nat. Mus., Biological Survey Coll. Collected July 30, 1895, by C. P. Streator. Original No. 4720.

General characters.—Size very large—much the largest of the species occurring north of Mexico except *P. californicus*, from which it differs in so many characters as to require no comparison; tail long; ears medium or rather small; coloration dark, in summer pelage reddish brown.

Color.—Upper parts brown, becoming russet posteriorly on back, rump, and sides; ring round eye (broadest in front of eye) and posterior aspect of ankles, dusky; under parts white, the plumbeous under fur showing through; fore and hind feet whitish; tail sharply bicolor, blackish above, broadly white below; ears dusky, narrowly edged with whitish.

Cranial characters.—Skull large; braincase rather flat; rostrum greatly elongated; pterygoid fossæ unusually developed. Contrasted with the skull of *P. californicus*, the only species which equals or exceeds it in size, the braincase is very much smaller and lower and the rostrum very much longer. The total length of the skull is greater than in *californicus*, although *californicus* is much the larger animal.

Measurements.—Type specimen: total length, 222; tail vertebræ, 112; hind foot, 26. Average of 20 specimens from type locality: total length, 218; tail vertebræ, 111.6; hind foot, 26.2. *Cranial measurements:* total length, 31; basilar length of Hensel, 24; zygomatic breadth, 15; incisors to postpalatal notch, 13; length of nasals, 13.

Remarks.—Apparently *Peromyscus sitkensis* is related to *P. macrorhinus* (Rhoads), from Skeena River, which latter animal I have not seen. It differs from *P. macrorhinus* in uniformly larger size, 'redder' color, and much longer nasal bones.

Zapus hudsonius alascensis subsp. nov.

Type from Yakutat Bay, Alaska. No. 73584, ♂ ad. U. S. Nat. Mus., Biological Survey Coll. Collected July 5, 1895, by C. P. Streator. Original No. 4660.

General characters.—Similar externally to *Zapus hudsonius* from northern Minnesota, but slightly larger; rostrum and zygomata longer; mandible larger; molars heavier; crown of last lower molar longer.

Color.—Dorsal area well defined, grizzled dusky and yellowish; sides from nose to base of tail ochraceous, conspicuously lined with black hairs; ankle dusky posteriorly; tail sharply bicolor, grayish brown above, whitish beneath; fore and hind feet soiled whitish.

Remarks.—*Zapus alascensis* is much more closely related to *Z. hudsonius* of the northeastern United States and Canada than to *Z. trinotatus* of the Puget Sound region. It agrees with *hudsonius* and differs from *trinotatus* in the narrow braincase, small incisive foramina, and relatively small under jaw. The crown of the last lower molar is longer than in either *hudsonius* or *trinotatus*.

Measurements.—Type specimen: total length, 225; tail vertebræ, 139; hind foot, 32. Average of 4 specimens from type locality: total length, 217.5; tail vertebræ, 132; hind foot, 31.5.

VOL. XI, P. 225 JULY 15, 1897

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

DESCRIPTION OF A NEW FLYING SQUIRREL FROM FT. KLAMATH, OREGON.

BY C. HART MERRIAM.

Sciuropterus alpinus klamathensis subsp. nov.

Type from Fort Klamath, Oregon (Transition zone, altitude 4200 feet). No. 87310, ♀ ad. U. S. Nat. Mus., Biological Survey Coll. Collected Jan. 11, 1897, by B. L. Cunningham. Original No. 355.

General characters.—Similar to *S. alpinus fuliginosus* Rhoads, but smaller; tail paler above and buffy below (not clouded with dusky). Differs from *fuliginosus* in having the nose and head much paler, cheeks yellowish white instead of bluish gray, and audital bullæ smaller.

Color.—Upper parts dark drab brown, sometimes tinged with pale dull fulvous brown; under parts yellowish buff, the plumbeous under fur showing through; tail: upper surface like back, but somewhat darker, especially toward the end; under surface uniform deep buff; nose and face pale; cheeks pale yellowish gray; top of head very pale grayish fulvous; ears decidedly paler than in true *alpinus* or *fuliginosus.*

Cranial characters.—Contrasted with *S. alpinus* the skull is narrower posteriorly, particularly the braincase and posterior roots of the zygomata. Compared with *fuliginosus* the audital bullæ are decidedly larger and the braincase is less strongly decurved posteriorly.

Measurements.—Type specimen: total length, 329; tail vertebræ, 138; hind foot, 38.

Vol. XI, pp. 227-230 JULY 15, 1897

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

DESCRIPTIONS OF FIVE NEW SHREWS FROM MEXICO, GUATEMALA, AND COLOMBIA.

BY C. HART MERRIAM.

Blarina thomasi sp. nov.

Type from Plains of Bogota, Colombia (on G. O. Child's estate near City of Bogota, alt. about 9000 feet). Collected Nov. 14, 1895. Type in British Museum.

General characters.—Size large; coloration sooty-plumbeous. Similar to *B. fossor*, but fore feet very much smaller and molariform teeth not excavated posteriorily.

Color.—Sooty plumbeous, darkest on the back.

Cranial and dental characters.—Skull and palate almost exactly as in *B. fossor*, but molariform teeth solid (not excavated posteriorly) and unicuspidate teeth with inner cusp behind instead of in front (on postero-internal instead of antero-internal angle).

Remarks.—For the opportunity to describe this very interesting shrew I am indebted to Mr. Oldfield Thomas, Curator of Mammals in the British Museum, who sent me seven specimens from the type locality. Heretofore the genus *Blarina* has not been recorded from any point south of Costa Rica; hence the discovery of the present species in South America is of unusual interest.

Measurements (from dry skin).—Total length, 110; tail vertebræ, 28; hind foot, 14.5; skull, 21 x 10.

Notiosorex gigas sp. nov.

Type from Mts. at Milpillas, near San Sebastian, Jalisco, Mexico. No. 88012, ♀ ad. U. S. Nat. Mus., Biological Survey Coll. Collected March 15, 1897, by E. W. Nelson and E. A. Goldman. Original No. 10706.

General characters.—Similar to *Notiosorex crawfordi*, but very much larger; tail relatively as well as actually longer.

Color.—Uniform slate gray, slightly darker on rump and slightly paler on under parts; belly with a faint brownish tinge; tail concolor with upper and lower surfaces of body.

Cranial and dental characters.—Skull large and massive, widely different from *N. crawfordi* and *evotis;* braincase highly arched, as in *Blarina mexicana*, which it greatly resembles (see figure of skull of *B. mexicana*, N. Am. Fauna, No. 10, pl. 1, fig. 11, Dec. 1895): constriction swollen; walls of anterior nares thickened; teeth white throughout, without trace of color on tips; molars swollen and crowded, not excavated posteriorly.

Remarks.—Mr. Nelson caught 3 specimens of this fine shrew near the creek, just below the mouth of the canyon, at Milpillas. He says they were living under shelter of logs, rocks, and banks in damp places grown up to bushes and weeds away from the woods.

Measurements (from dry skin*).—Total length, 128; tail vertebræ, 45; hind foot, 15. *Cranial measurements:* total length of skull, including incisors, 23; greatest breadth, 10.5.

Sorex sclateri † sp. nov.

Type from Tumbala, Chiapas, Mexico (alt., 5000 ft.). No. 75872, ♀ ad. U. S. Nat. Mus., Department of Agriculture Coll. Collected Oct. 23, 1895, by E. W. Nelson and E. A. Goldman. Original No. 8567.

General characters.—Size large; tail long; hind foot very long (16 mm.); color similar to *S. macrodon*, but ears smaller, and skull very different.

Color.—Upper parts dusky, finely mixed with sepia brown, darkest over the rump; under parts seal brown; tail dusky; paler below, without line of demarkation; feet dusky.

Cranial and dental characters.—Skull large, long, and rather slender (20 x 9 mm.); rostrum, palate, and dentition (in general) much as in *S. saussurei caudatus*, but postpalatal region and braincase decidedly longer; interpterygoid fossa broad and long; first and second unicuspids subequal or second slightly the larger; third unicuspid, as seen from the side, decidedly larger than fourth; as seen from below, subequal or slightly smaller; teeth very white, the red tips greatly reduced.

Remarks.—*Sorex sclateri* is a very peculiar species, and does not seem to be at all closely related to any of the other shrews known from Mexico or Central America. The large size of the hind foot and peculiar elongation of the postpalatal part of the skull suffice to distinguish it from the species that approach it in size, while the relatively large size of the third unicuspidate tooth is distinctive. Singularly enough, in general form of skull and relative proportions of unicuspids *Sorex sclateri* resembles *S. oreopolus*, a small short-tailed species inhabiting the Sierra Nevada de Colima of Jalisco.

Measurements.—Type specimen: total length, 126; tail vertebræ, 52; hind foot, 16. Average of 5 specimens from type locality: total length, 125; tail vertebræ, 53; hind foot, 16.

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* Field measurements not yet received from collector.

† Named in honor of Dr. Philip Lutley Sclater, the distinguished Secretary of the Zoölogical Society of London.

Sorex salvini * sp. nov.

Type from Calel, Totonicapan, Guatemala (alt., 10200 ft. = 3100 meters). No. 77035, ♀ ad. U. S. Nat. Mus., Department of Agriculture Coll. Collected Jan. 12, 1896, by E. W. Nelson and E. A. Goldman. Original No. 9057.

General characters.—Size small (about equalling *S. ventralis*); ears medium or rather large; tail rather short; *belly very dark*, thus differing from all the other known small species from either Mexico or Guatemala.

Color.—Upper parts rich dark sepia brown, darkest over the rump; under parts seal brown; tail faintly bicolor.

Cranial and dental characters.—Skull similar to that of *ventralis*, but somewhat larger (18.5 mm.); constriction of rostrum more swollen. First and second unicuspids subequal; third slightly larger than fourth as seen from the side, but really smaller as seen from below. Molariform teeth moderately excavated; larger than those of *ventralis.*

Remarks.—This small shrew seems to be more nearly related to *ventralis* than to any other. It is very much darker than *ventralis*, both above and below, has a slightly longer tail, larger skull, and larger molariform teeth.

Measurements.—Type specimen: total length, 104; tail vertebræ, 41; hind foot, 13 5. Average of two specimens from type locality: total length, 106; tail vertebræ, 42; hind foot, 13.75.

Sorex godmani * sp. nov.

Type from Volcano Santa Maria, Quezaltenango, Guatemala (alt., 9000 ft. = 2740 meters). No. 77044, ♀ ad. U. S. Nat. Mus., Department of Agriculture Coll. Collected Jan. 28, 1896, by E. W. Nelson and E. A. Goldman. Original No. 9239.

General characters.—Size rather large (hind foot nearly 15 mm.); tail long; ears conspicuous; similar to *S. caudatus*, but color less dark and skull decidedly smaller.

Color.—Upper parts uniform dark sepia brown with a faint chestnut tinge; under parts seal brown; tail dark all round.

Cranial and dental characters.—Skull of normal shape (braincase somewhat flattened in type specimen), rather small for size of animal; first and second unicuspids subequal, third slightly smaller than fourth; molariform teeth rather deeply excavated posteriorly. Skull similar in general to that of *caudatus* but much smaller (18 x 8 mm. instead of 19.5 x 9.5); molariform teeth much smaller and more deeply excavated posteriorly.

Remarks.—*Sorex godmani* agrees with *S. stizodon* in color, but is larger, has a much longer tail (55 mm. instead of 41) and very different skull and teeth (skull more slender and delicate; pm and m $\frac{1}{}$ and m $\frac{2}{}$ much more deeply excavated posteriorly; second unicuspid *not* larger than first). Its nearest relative seems to be *S. saussurei caudatus*, which differs from it in somewhat darker coloration, in having the tail decidedly paler below, and in the cranial and dental peculiarities already described.

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* These two species are named in honor of Osbert Salvin and F. Du Cane Godman, the distinguished editors of the Biologia Centrali-Americana. Their names must ever be associated with the natural history of Guatemala.

Measurements.—Type specimen: total length, 120; tail vertebræ, 57; hind foot, 15. Average of 4 specimens: total length, 122.5; tail vertebræ, 55; hind foot, 14.7.

Specimens examined.—Total number, 4, from the following localities in Guatemala:

Volcano Santa Maria, Quezaltenango (type locality), 3.
Todos Santos, Huehuetenango, 1.

VOL. XI, PP. 231-234 SEPTEMBER 17, 1897

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

DIAGNOSES OF NEW SPECIES OF FISHES FOUND IN BERING SEA.

BY THEO. GILL AND CHAS. H. TOWNSEND.

In 1895 the junior author served as naturalist on the U. S. Fish Commission steamer *Albatross* and obtained many fishes at various depths. Among them were 14 species apparently hitherto undescribed. Diagnoses of these are here given by permission of Captain John J. Brice, U. S. Commissioner of Fish and Fisheries, and will hereafter be described at length and illustrated.

RAIIDÆ.

Raia rosispinis.

Snout moderately produced, with a soft, moderately narrow rostral cartilage and a blunt tip. Interorbital space nearly plane. Snout with a number of plates having stellate bases about middle, and many smaller asperities, leaving only the borders of the pectorals and ventrals naked. Larger spines with stellate bases are interspersed between the disk and the pectoral rays. A row of about 26 thorn-like spines, with radiating ridges, extends from the interhumeral area to the dorsal fins; two spines on each shoulder. One spine above antocular region, another above postocular region, and another behind it about half the distance.

Raia obtusa.

Snout not at all produced, but very bluntly rounded. Interorbital space narrow. Mouth small, rectilinear. Minute distant prickles on the snout, the anterior portion of disk and interorbital area, as well as in a broad median band extending on tail to dorsal and commencing at the interhumeral area; a row of scarcely enlarged acute spines above the eye; an uninterrupted row of unguiform spines with smoth bases extending from the interhumeral area to dorsal fin; two similar spines arm each shoulder.

Raia interrupta.

Snout moderately produced, with a soft very attenuated rostral cartilage and a blunt tip. Interorbital space concave. Mouth small; the width equal to half preoral area. Entire back covered with very small embedded spines, extending nearly uniformly over the disk and snout, leaving only the tip of the latter naked; a row of compressed acutely curved, smooth spines along middle of back, extending from the interhumeral region to dorsal, but interrupted along the posterior half of disk, where the spines are absent or obsolete; about four spines are in the anterior portion and the series recommences on a line with the emargination of the disk; a single spine on each shoulder and occasionally a rudimentary second; no specialized supra-orbital spines.

NOTACANTHIDÆ.

Macdonaldia alta.

D., 32; A. (31 to end of dorsal) 52 spines, 125 rays.

Body comparatively high; greatest height equal to 3⅔ the distance between vent and tip of snout. Pectoral fin with its root twice as far from upper cleft of branchial aperture as from the lateral line, and much nearer to the posterior end of operculum than to lateral line.

Bering Sea, Lat. N. 54° 54′, Long. W. 168° 59′ (station 3604, Aug. 13, 1895; 1401 fathoms).

Macdonaldia longa.

D., 33; A. (26 to opposite end of dorsal) 55 spines, 111 rays.

Body comparatively slender, with the greatest height about one-fifth distance between vent and tip of snout. Pectoral fin with its root three times as far from upper cleft of branchial aperture as from lateral line, and very much nearer lateral line than end of operculum.

Bering Sea (station 3607, 1895; 900 fathoms).

ALEPOCEPHALIDÆ.

Ericara, new genus.

Alepocephalids with small, perfectly smooth, imbricated cycloid scales, wide cranium, projecting snout, deeply cleft mouth, uniserial and acrodout teeth on vomer and anterior portion of palatines, and dorsal and anal of normal extent and opposite each other.

Ericara salmonea.

Dorsal, 17; anal, 24. Maxillary extending to vertical of posterior border of orbit. Head large: length, 8½; depth, 5; width, 4½.

Bering Sea, S.W. of Pribilof Islands (station 3603, 1895; 1771 fathoms).

LYCODIDÆ.

Lycodes digitatus.

Body moderately elongate, its greatest height being between ⅛ and ⅑ of the total length; covered with small, entirely separated embedded scales, which become nearer anteriorily and extend in advance of the dorsal fin as well as on the vertical fins. No specialized area of smaller scales behind base of pectorals. Pectorals scaleless. Head moderate, $\frac{1}{5}$ in length, entirely naked.

Color (in alcohol) brownish yellow suffused with reddish in front, variegated, darker anteriorily, with four dark longitudinal bands most distinct about middle of body, fading out backwards. Fins light and without dark margins. Head dark above and laterally, light below. Dorsal, 101; ventral, 81; pectoral, 18.

Bering Sea, Lat. N. 56° 14′, Long. W. 164° 8′ (station 3541; 49 fathoms).

Lycodes concolor.

Body rather elongated, its greatest height being less than $\frac{1}{7}$ total length; covered with very small, entirely separated embedded scales which become more distant anteriorly and extend in advance of the dorsal fin and scapular region, as well as on the vertical fins; pectorals with scattered scales on external and internal surfaces near base. A specialized area of smaller scales behind base of pectoral and a naked area around upper axilla of pectorals. Head moderate, a fifth of total length, entirely naked. Color nearly uniform, only relieved by the apparently lighter hue of the scales and the somewhat darker margins of the fins. Dorsal, 118; ventral, 98; pectoral, 21.

Bering Sea, Lat. N. 55° 19′, Long. W. 168° 11′ (station 3608, Aug. 12, 1895; 276 fathoms).

MACRURIDÆ.

Macrurus lepturus.

Type 22 inches long. D., 14–122. A., 116. P., 20. V., 8.

Scales deciduous and moderate, oblong or oval with reduced exposed surfaces; those on the back or above the lateral line have a few (3–5) ridges beset with spines, but those below are mostly unarmed. Head one-sixth of entire length, regularly conical. Snout moderately extended. Median tubercle very projecting; lateral well developed, connected by well defined ridge; infraorbital vertical, with the ridge linear and near the orbit. Teeth cardiform in both jaws; the lower teeth beset the outer slope of the jaw.

Bering Sea, S. W. of Pribilof Islands (station 3604; 1401 fathoms).

Macrurus dorsalis.

Type length, 26 inches. D., 15–120. A., 122. P., 21. V., 9.

Scales deciduous and rather small, diversiform, with small exposed surfaces; near the dorsal they have about five radiating spinigerous ridges, but below the lateral line these ridges are fewer and unarmed. Head a little more than one-sixth of the length. Snout short, projecting a considerable length beyond the eye and a little beyond the supramaxillary. Median tubercle very prominent; connecting ridge is well defined; infraorbital nearly vertical, with the ridge linear and near the orbit. Teeth cardiform.

Bering Sea, S. W. of Pribilof Islands (station 3604; 1401 fathoms).

Macrurus firmisquamis.

Type 31 inches long. D., 12–126. A., 105. P., 20. V., 8.

Scales firmly affixed, oblong or rather short, and with considerable exposed surfaces, which have subequal radiating ridges beset with numerous acute spinelets; the ridges vary from 3 to 8 in number. Head regularly convex in profile, a fifth of the entire length. Snout longer than the diameter of the eye. Rostral tubercles obsolete and infraorbital ridge rounded. Teeth biserial or triserial. This species is distinguishable from all its American congeners, at least, by the very firm scales.

Bering Sea, S. W. of Pribilof Islands, 1895.

Macrurus (Nematonurus) magnus.

Type 43 inches long. D., 9–128. A., 121. P., 15. V., 6.

Scales moderately large, readily deciduous, decidedly oblong or long, with a small exposed surface which is beset with five to seven radiating unarmed ridges. Head regularly conical, less than one-fifth of the length. Snout rather long; projects half its length beyond the mandible. Tubercles feebly developed, plain and continuous from 3 parallel ridges; infraorbital flat, with the crest rather nearer the orbit than its lower margin; its entire surface scaly. Teeth in the upper row biserial or triserial; in lower jaw imperfectly biserial or uniserial.

Bering Sea, S. W. of Pribilof Islands.

Macrurus (Nematonurus) suborbitalis.

Type 20 inches long. D., 12–85. A., 102. P., 19. V., 11.

Scales closely adherent and rather large, mostly short and roundish, with considerable exposed surfaces, having radiating ridges beset with weak spines. Head a little more than one-sixth of the entire length. Snout projects little. Median and lateral tubercles are faintly developed; infraorbital narrow, divided into two well marked areas—an upper wider, distinguished by the glassy tubercular scales, and the narrow lower, almost skinny and scaleless; the ridge independently, is little marked. Teeth biserial in the upper jaw, robust in the outer row, very weak in the inner; uniserial in lower jaw and scarcely incurved.

Bering Sea, S. W. of Pribilof Islands (station 3603; 1771 fathoms).

PLEURONECTIDÆ.

Hippoglossoides robustus.

Body rather high, its greatest height nearly equaling half the length from the snout to base of caudal. Profile decurved above the eye. Body thick. Scales on head separate and rarely touch each other. Lateral line more arched than in allied species. Teeth of the single row mostly separated from each other by intervals equal to width of teeth, curved inward, and uniform on the sides; toward front four or five enlarged teeth, preceded by two smaller, leaving the middle toothless. In the lower jaw of nearly uniform size and inclining backwards.

Bering Sea, Lat. N. 56° 14′, Long. W. 164° 8′ (station 3541; 49 fathoms).

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VOL. XI, PP. 235-240 SEPTEMBER 17, 1897

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

ON A SMALL COLLECTION OF MAMMALS FROM HAMILTON INLET, LABRADOR.

BY OUTRAM BANGS.

In the early summer of 1895 Mr. C. H. Goldthwaite started for Hamilton Inlet, Labrador, to collect mammals for the Bangs' Collection. Upon reaching St. Johns, Newfoundland, he was met by the discouraging news that on account of the troubles of the government and the low state of its finances, there was some doubt as to whether its steamer would make the usual annual trip up the Labrador coast for the purpose of carrying supplies and picking up shipwrecked fishermen and explorers. Most of the fishing vessels that visit Labrador in summer had already sailed, but after much delay and trouble he secured passage from Conception Bay in a belated fisherman, and finally arrived at Hamilton Inlet, after a long and tedious voyage.

Here he collected from July 5 to September 9, in the immediate vicinity of the Hudson Bay post of Rigoulette, about eighty miles up Hamilton Inlet, or Grosswater Bay, as it is usually called by the inhabitants. I had hoped that his work would cover a larger area, and that he might get far enough from the post to collect fur-bearing and other large animals, but this proved impossible. The only way to make such a trip successfully would be to go prepared to remain throughout the winter. In summer the inhabitants are all busy with salmon fishing, their principal means of subsistence, and cannot be induced to go inland, even if this were practicable. The heavy growth of moss, saturated with moisture, into which a man sinks above the knee at every step, makes traveling so laborious as to be nearly impossible, while the constant annoyance from the attacks of blood-sucking flies of four or five kinds becomes almost intolerable. In winter traveling on snow-shoes or on dog sledges is very easy. Then all the men go inland to their various trapping grounds and stay through the season, and if a collector went along with them he could undoubtedly reap a rich harvest. The country about Rigoulette is heavily wooded with a rather stunted growth of spruce and fir, but so near timber line is it that the tops of the hills are devoid of trees. In some places there were large fields of snow that remained unmelted throughout the entire summer. The country is monotonous and offers little diversity for trapping, and with the exception of the lemmings (*Dicrostonyx*), which inhabit only the treeless tops of the hills, all the smaller mammals live under about the same conditions.

In collecting small mammals anywhere one is sure to find some pest to interfere with trapping by eating specimens or bait, or both, and Hamilton Inlet was no exception to the rule. Mr. Goldthwaite's two principal enemies were the Labrador jay and the Esquimaux dog. The jays soon discovered what he was doing, and would follow him in a loose flock, sitting about and watching while he set a trap, and would then descend upon it and steal the bait the moment his back was turned. Often one of them fell a victim to the wicked little Schuyler trap, but this never deterred the others, and no matter how many were killed, there were always as many more following him. The dogs were even worse, for turned out in the summer to forage for themselves, they hunt over the country in packs for miles in every direction. They feed largely on mice, lemmings, and all small mammals, and were very quick to find one caught in a trap. Several of the dogs also got into baited steel traps, and as they are highly prized, especially the leaders. Mr. Goldthwaite was requested by the owners to refrain from setting steel traps at that season of the year.

Mr. Goldthwaite collected the following mammals:

Lepus americanus americanus Erxl.

Abundant everywhere. A fine series of 14 young and adult examples has led me to take up a careful study of a large number of specimens of the American hare from many points in eastern North America, the results of which will be published in a separate paper.

The type of *Lepus americanus*, as is well known, came from the south side of Hudson Strait. Hamilton Inlet is not only much south of this, but appears to have quite a different fauna, the small mammals especially being different from those taken at Fort Chimo by L. M. Turner. It is therefore probable that typical *Lepus americanus* is even more extreme than the Hamilton Inlet series, which is at present the best working material available.*

Zapus hudsonius (Zimmerman).

Three specimens were caught in the damp mossy spruce woods.

Fiber zibethicus (Linn.)

Muskrats were very scarce about Hamilton Inlet, but were said to be abundant in the lakes and rivers of the interior. The one specimen collected, an adult, agrees in every way with true *zibethicus* of northeastern North America generally, and shows no approach to the insular form (*Fiber obscurus*) found in Newfoundland.

Dicrostonyx hudsonius (Pallas).

Three specimens of the Hudsonian lemming were secured, all taken at the entrance to one hole on top of a treeless hill. A fourth was also trapped at the same hole, but afterwards destroyed. The lemming was well known to the natives, who called it 'hill mouse,' and said it was usually abundant on all the hills. Mr. Goldthwaite worked very hard to get more, but the dogs had visited all suitable places and dug out the lemmings before he arrived, and the hole where he caught his specimens was the only one he could find that was occupied.

Mr. Gerrit S. Miller, Jr., who examined these specimens at the time he wrote his 'Genera and Subgenera of Voles and Lemmings,' tells me that this lemming is not like any of the old-world species. The name *Mus hudsonius* Pallas † apparently applies to this species, which may be briefly described as follows:

Color.—Upper parts gray (about the color of a Maltese cat), somewhat mixed with black tipped hairs and slightly touched in places with rusty; a narrow black stripe along middle of back; long hairs covering ear, mixed black and rusty; a spot of pale yellowish rust color at base of whiskers. Lower sides and under parts dull brownish gray, irregularly washed with rusty, the rust color predominating in front of arms, across chest, and about vent. Feet, hands, and tail dull gray, hairy. Tail with a long pencil nearly equaling length of tail.

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* The Arctic Hare is said to occur at Hamilton Inlet, but Mr. Goldthwaite was unable to get one. It was reported to be more abundant in winter than in summer.

† Richardson (Fauna Boreali-Americana, 1829, p. 132) refers the specific name *hudsonius* to Forster. I cannot find that Forster ever gave his animal (a mutilated specimen) a scientific name, merely styling it 'a small animal called a Field Mouse, Churchill River,'

Measurements.—The three specimens measured as follows:

No.	Sex.	Total length.	Tail vertebræ.	Hind foot.
4166	♂ old.	150	21	20
4167	♂ yg. ad.	145	22	22
4168	♂ yg.	128	16	20

Skull.—The skull of 4166, ♂ old adult, measures: basal length, 28.6; zygomatic breadth, 19.8; mastoid breadth, 14.2; alveolar length of upper molar series, 7.6; incisive foramen, 5.6. That of an adult male *D. torquatus* from Petschora, Russia (No. 3621, collection of Gerrit S. Miller, Jr.), measures: basal length, 27.4; zygomatic breadth, 19; mastoid breadth, 14; alveolar length of upper molar series, 7.4; incisive foramen, 6.8.

These specimens are of approximably equal age, so that they furnish a very satisfactory basis for comparison. The skull of *D. torquatus*, though actually slightly smaller, gives the impression of greater strength and massiveness. This is chiefly due to its broader, less deflected rostrum and slightly shorter, broader brain case. While the width of rostrum is less and the deflection of dorsal outline greater in *D. hudsonius*, the rostral depth at the root of the zygoma is slightly greater in *D. torquatus*. Audital bullæ in *D. hudsonius* distinctly larger and less globular than in *D. torquatus*.

Teeth.—As has recently been pointed out,* there is a minute supplemental anterior internal loop in the posterior lower molar of *Dicrostonyx hudsonius* which is apparently absent in the Old World species. Otherwise the dentition calls for no special comment.

Synaptomys (Mictomys) innuitus (True).

Only one specimen was collected. Dr. C. Hart Merriam and Mr. Gerrit S. Miller, Jr., have kindly compared this specimen with the type of *innuitus* from Fort Chimo, Labrador, with the following results: The Hamilton Inlet specimen is younger than the type of *innuitus*, but is larger, the hind foot measuring 3 mm. more and the skull being actually larger; the tail is also longer. It is a pity that only one specimen from each locality is in existence, as more material from Labrador would probably show that two well marked forms occur there, as is the case with *Evotomys* and probably with *Phenacomys ungava* also. The measurements of the specimen, No. 3972, ♂ young adult, are: total length, 114; tail vertebræ, 25; hind foot, 21.

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* Miller, North American Fauna, No. 12, p. 39, foot-note, July 23, 1896.

Microtus enixus Bangs.*

Next to *Evotomys*, this species was the commonest small mammal about Hamilton Inlet. It was found living everywhere, but was especially abundant along the banks of the brooks where a few reeds and grasses grew; 80 specimens were obtained.

It is very distinct from all other eastern voles, and is at once distinguished by its peculiarly small, weak, molar teeth. (See figure 13.)

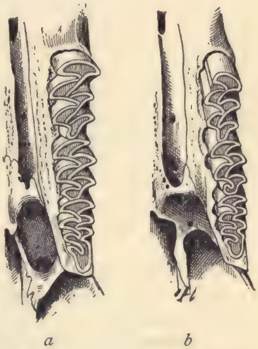

FIG. 13.—*a*. Left upper molar series of *Microtus pennsylvanicus* (Topotype No. 2336, Bangs coll.)

b. Left upper molar series of *Microtus enixus* (Topotype No. 3976, Bangs coll.)

Evotomys proteus Bangs.†

The *Evotomys* was the commonest small mammal, and was found everywhere. No less than 99 specimens were collected. Several times while walking through the forest Mr. Goldthwaite discovered one sitting upon a spruce branch 'like a squirrel.' I have never known of this arboreal habit being noticed in other species. The range of individual color variation in *Evotomys proteus* is simply astounding, and it seems incredible that extremes from the series can belong to the *same* species, yet any specimen picked out can be graded by the most delicate steps into any of the other extremes. The accompanying plate shows admirably a few of the most pronounced color phases.

The Hamilton Inlet and Fort Chimo red-backed mice are very different, representing opposite extremes in the genus. The latter, lately described by Vernon Bailey as *Evotomys ungava*,‡ is a small form with small hind foot, short tail, and little ears concealed by the fur. *E. proteus* is a very large form, with heavy skull, big feet and tail, and large ears.

Phenacomys ungava Merriam.

The 16 individuals of this interesting species that were caught were all found in one small area on the bank of a little brook, associated with *Microtus enixus* and *Evotomys proteus*. None were taken anywhere else. Mr. Miller had this series when he wrote his 'Synopsis of the Voles of the Genus Phenacomys,' and found that the form is much larger than true *P. ungava*. It is very possible that more specimens from Fort Chimo would show the Hamilton Inlet form to be worthy of separation.

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*Preliminary Description of a New Vole from Labrador, American Naturalist, XXX, Dec. 5, 1896, p. 1051.

†In Vernon Bailey's Revision of the American Voles of the Genus *Evotomys*, Proc. Biol. Soc. of Washington, XI, May 13, 1897, p. 137.

‡Loc. cit., p. 130.

Sciurus hudsonicus hudsonicus Erxl.

Red squirrels were not at all common, four being all that Mr. Goldthwaite was able to get, though constantly on the lookout for them.

Sorex personatus I. Geoffroy St. Hilaire.

This species is represented by one skull, kindly identified as *S. personatus* by Mr. Gerrit S. Miller, Jr.

It is strange that in all the trapping he did near Hamilton Inlet Mr. Goldthwaite caught but one shrew and no moles.*

Putorius cicognani cicognani (Bonaparte).

Mr. Goldthwaite's collection contained 2 specimens ♂ and ♀, which, though taken at a locality so strictly Hudsonian in character, are perfectly referable to the Canadian form, true *cicognani*. This would seem to indicate that typical *Putorius cicognani* pushes farther north in the east than it does in the central part of the continent. The two specimens collected measure as follows: No. 3951, ♂ adult: total length, 300; tail vertebræ, 90; hind foot, 43. No. 3952, ♀ young adult: total length, 256; tail vertebræ, 66; hind foot, 31.

Possibly another form may be found farther inland, as the spruce and fir forest only extends in a narrow belt along the coast, the whole interior being open 'barren grounds,' where the conditions of life must be different from those near the coast.

EXPLANATION OF PLATE IV.

A series of topotypes of *Evotomys proteus*, in collection of E. A. and O. Bangs, showing some of the color phases to which the species is subject. (All specimens are from Hamilton Inlet, Labrador.)

Fig. 1, No. 4054; Fig. 2, No. 4053; Fig. 3, No. 4068; Fig. 4, No. 4088; Fig. 5, No. 4085; Fig. 6, No. 4118; Fig. 7, No. 4139.

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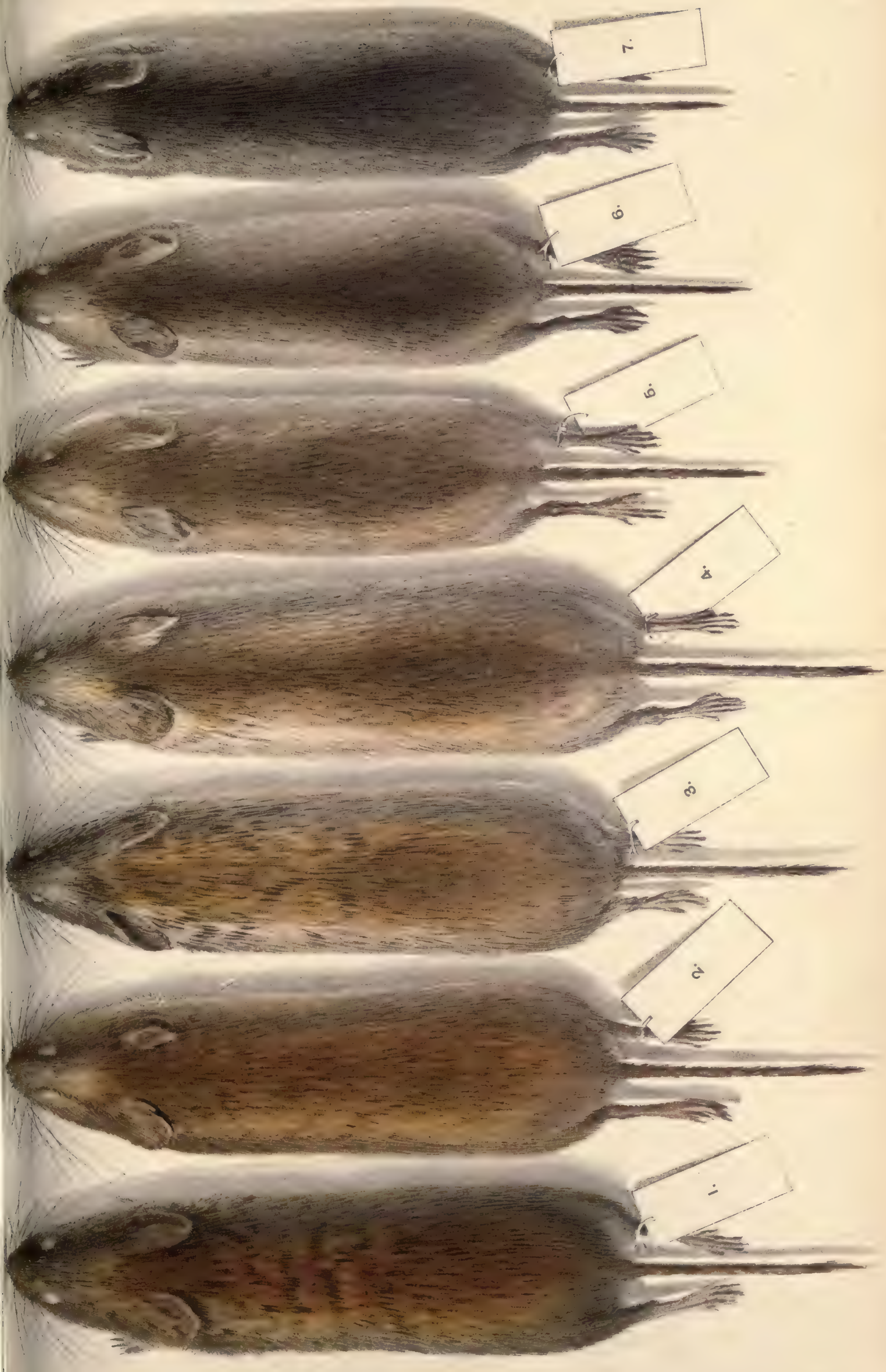
* One morning Mr. Goldthwaite saw several dogs nosing about a star-nosed mole (*Condylura cristata*) which they had caught but did not relish. One of them, however, instantly swallowed it when he tried to rescue it. He was unable to find any signs of this mole anywhere and secured no specimens.



EVOTOMYS PROTEUS, Bangs, SHOWING VARIATIONS IN COLOR.

nry Blake ad nat.del

A.Hoen & Co.Lith. Baltimore

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PROCEEDINGS

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A LIST OF THE GENERIC AND FAMILY NAMES OF RODENTS.

BY T. S. PALMER.

Generic names of mammals have undergone many changes in recent years, and in no group is this more apparent than in the Rodentia. Not only have new names been proposed for a host of new forms, but many well-known genera now appear under names long forgotten, but revived in obedience to the law of priority. Linnæus, in 1758, recognized only six genera of rodents (including *Rhinoceros!*); Agassiz, in 1842–'46, recorded about 220 generic names in this order, and Marschall, in 1873, added 65 more, making a total of somewhat less than 300. The present list contains more than 600 (a large proportion of which are, of course, synonyms), comprising perhaps 15 percent of the entire number of generic and subgeneric names ever proposed for mammals.

Recent changes in the nomenclature of the Rodentia are well exemplified in two important papers which have appeared during the past few months—one, by Mr. Oldfield Thomas, entitled 'On the Genera of Rodents';[1] the other, by Dr. E. L. Trouessart, comprising part of the second edition of his 'Catalogus Mammalium.' The former paper gives merely a list of the groups of living rodents which the author considers worthy of generic rank, together with references to the original description of each genus. Trouessart's Catalogue, more ambitious in its scope, is intended to include all the species, living and extinct, now recognized. Even with these aids the student will often find difficulty in looking up synonymy or determining the earliest name of a genus, for Thomas gives only about one-third of the names, while Trouessart does not pretend to include all the generic synonyms and frequently omits references.

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[1] Proc. Zool. Soc. London, 1896, pp. 1012–1028.

The present paper differs from either of those just mentioned. It is neither an index nor a catalogue of recognized genera, but merely an attempt to bring together *all* the names, generic and subgeneric, ever proposed. It is not complete in itself, inasmuch as it gives neither references to descriptions nor localities; but the authority, date of publication, and type or included species under each name will throw some light on these points. In arranging this list everything has been subordinated to convenience of reference. Genera and subgenera have been treated alike and distributed under families, while the alphabetical arrangement has been followed both in the sequence of higher groups and in the names under each family. Some difficulty has been experienced in properly grouping the genera, and about a dozen names have not been referred to any family for lack of sufficient information regarding their status. Thomas' classification of recent genera has been followed, except in the case of *Lophiomyidæ*, which is given full family rank, instead of being placed as a subfamily under *Muridæ*. To these 22 groups have been added 5 additional families of extinct rodents recognized by Zittel,[1] making a total of 27 families. More than 200 names occur under *Muridæ*, and for simplicity they have been placed under subfamilies, but this is the only instance in which the alphabetical arrangement of the family has not been followed.[2]

The date is always the year of *actual publication*, often very different from the date of apparent publication. For example, the description of *Schizodon* was published in the Proceedings of the Zoological Society of London for 1841, but it did not actually appear until March, 1842. *Arctomys* was described in a part of the fourth volume of Schreber's Säugthiere, issued in 1782, but the name was first published on plates accompanying this work, which are known to have been distributed in 1780. *Schizodon* is therefore quoted as 1842 and *Arctomys* as 1780.[1] Preoccupied names have been marked, and cross-references made to those proposed to replace them. A few names have become almost unrecognizable by reason of the changes they have undergone in the process of emendation. Among such may be mentioned the correction of *Aplodontia* to *Haploodus*, *Pithecheir* to *Pithecochirus*, and *Cœlogenus* to *Genyscœlus*.[2] The original spelling is always given, but no attempt has been made to include all variations, although the more important have been noted. If the first letter of a word has been changed, both forms have been inserted in the list, but other changes have been indicated in foot-notes.

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[1] 'Handbuch der Palæontologie,' IV, 1892–'93.

[2] I am indebted to Mr. Thomas for looking over the genera of *Muridæ* and *Octodontidæ* and for several suggestions as to the arrangement of the list.

Each genus is followed by the type or species on which it was based. When no type was designated and none has been indicated by a subsequent reviser, all the species are mentioned in the order given in the original description. No doubt some errors will be detected here, for at first an attempt was made to determine the types for as many genera as possible. This plan was subsequently abandoned in favor of an enumeration of all the species originally mentioned, but some cases of elimination may have escaped correction.

More or less lack of uniformity exists in the nomenclature of certain families, as, for example, in the cases of the American Porcupines and Chinchillas. Thomas, considering the New World Porcupines worthy of separation, erected the family *Erethizontidæ*, and Trouessart, a few months later, recognized the same group, but renamed it *Coendidæ*. No less than three family designations for the Chinchillas are in common use—*Chinchillidæ*, *Eriomyidæ*, and *Lagostomyidæ*. Such a condition of things is obviously unnecessary, and can only lead to confusion. As an aid in selecting the proper name in such cases and to help in determining questions of priority, it has seemed best to give under each group all the family and subfamily names based on genera belonging to it. Full references have also been inserted, inasmuch as authors seldom indicate the place where such names were first published. Groups first described as full families and afterwards reduced to subfamilies have merely a reference to the original description, but those first introduced as subfamilies and afterwards raised to family rank have references to both places of publication. This part of the list has been limited strictly to names ending in '*idæ*' or '*inæ*,' the only exception being old designations with the closely related termination '*ina*.' Here, as elsewhere, the object has been merely to bring together under each family all the available names, without attempting to discriminate between synonyms and names which have a claim to recognition.[1]

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[1] While this paper was in press, my attention was called to Sherborn's announcement of the discovery of Lacépède's well-known 'Tableau Méthodique' (usually quoted 1801), in the Didot edition of Buffon's Histoire Naturelle, Quad., vol. XIV, 1799 (Nat. Sci., XI, p. 432, Dec., 1897). Lacépède's genera *Agouti*, *Arvicola*, *Coendou*, *Hamster*, *Pika*, and *Talpoides* therefore date from 1799, instead of 1801, but the necessary corrections could only be inserted in the cases of *Pika* and *Talpoides*.

[2] In explanation of this remarkable emendation the author says: "Le υ grec ne répondant pas à l'u latin, le nom de Cuvier [*Cœlogenus*] n'est pas acceptable, puisqu, il renferme une faute d'orthographie; et, pour faire un nom d'apparence réellement latine, il aurait au moins fallu écrire *Genyscœlus* et non *Cœlogenus*." Liais, Climats du Bresil, 1872, p. 537.

This list is supplementary to a complete alphabetical index of the genera of mammals, containing full references to descriptions and localities, which is now almost ready for the press. The data relating to the Rodentia are here grouped under families and published in condensed form for the purpose of inviting suggestions and criticisms as to arrangement, type species, and grouping of genera. The list is therefore merely an experiment. Although the names have been brought together, much remains to be done in working out the synonymy of types, but such work properly belongs to the specialist and the reviser of groups. When this has been done some examples of duplication of names will probably be found even more striking than the case of the lemmings, in which a single species (*Mus torquatus* Pallas) has served as the basis for five or six nominal genera.

As a help in distinguishing the names, extinct genera are printed in *italics;* an asterisk (*) indicates that the original description has not been seen; a dagger (†) that the name is preoccupied, and a double dagger (‡) prefixed to a family or subfamily that the name is not available, either because the genus on which it was based is preoccupied or because it is antedated by some other valid name.

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[1] Forsyth Major has recently proposed *Nesomyinæ* for certain Old World mice usually classed under *Cricetinæ*; but as he does not give the limits of this group Thomas' classification is necessarily followed, although *Nesomyinæ* may be entitled to subfamily rank as much as the group under which it is placed.

ANOMALURIDÆ.

Anomalurina Gervais, in D'Orbigny's Dict. Univ. d'Hist. Nat., XI, p. 203, 1849.

Anomaluridæ Gill, Arrangement Fam. Mamm., p. 21, Nov., 1872.

Name, authority, and date.	Type or included species.
Anomalurus Waterhouse, 1843.	Anomalurus fraseri.
Aroæthrus Waterhouse, 1843.	Suggested to replace Anomalurus, in case latter is preoccupied.
Idiurus Matschie, 1894.	Idiurus zenkeri.

APLODONTIIDÆ.

Haploodontidæ Lilljeborg, Syst. Öfversigt Gnag. Däggdjuren, pp. 9, 41, 1866.

Aplodontiidæ Thomas, Proc. Zool. Soc. London, 1896, p. 1015 (1897).

Aplodontia[1] Richardson, 1829.	Aplodontia leporina (=Anisonyx rufa Raf.)

BATHYERGIDÆ.

Bathyergina Gervais, in D'Orbigny's Dict. Univ. d'Hist. Nat., XI, p. 203, 1849.

Bathyergidæ Bonaparte, Conspectus Syst. Mastozoologiæ, 1850.

Georhychinæ Gill, Arrangement Fam. Mamm., p. 20, Nov., 1872.

‡ **Orycterideæ** Lesson, Nouv. Tableau Règne Animal, Mamm., p. 120, 1842.

Name, authority, and date.	Type or included species.
Bathyergus Illiger, 1811.	Mus maritimus.
Cœtomys Gray, 1864.	Bathyergus cæcutiens, B. damarensis.
Cryptomys Gray, 1864.	Georychus holosericeus.
* **Fossor** Forster.	(?)
Georychus[2] Illiger, 1811.	Mus capensis (type), M. talpinus, M. aspalax.
† **Heliophobius** Peters, 1846.	Heliophobius argenteo-cinereus.
Heterocephalus Rüppell, 1842.	Heterocephalus glaber.
Myoscalops Thomas, 1890.	New name for Heliophobius Peters.
Orycterus Cuvier, 1829.	Mus maritimus.
Typhloryctes Fitzinger, 1867.	Georychus ochraceo-cinereus, Bathyergus cæcutiens.

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[1] Emended to Haplodon (Wagler, 1830), Aploudontia, Apludontia, Apluodontia, Haploodon, Haploudon, Hapludon, Haploudontia, Haplodus, Haploodus, Haploudus, and Hapludus. (See Coues, Century Dict., III, p. 2712.)

[2] Emended to Georhychus (Wagner, 1843).

CASTORIDÆ.

Castoridæ Gray, London Medical Repository, XV, p. 302, April 1, 1821.
Mylagaulidæ Cope, Bull. U. S. Geol. & Geog. Surv. Terr., VI, No. 2, p. 362, Sept. 19, 1881.

Name, authority, and date.	Type or included species.
* *Aulacodon* Kaup, 1832	*Aulacodon typus.*
Castor Linnæus, 1758	Castor fiber (type), C. moschatus.
* *Castoromys* Pomel, 1854	*Chalicomys sigmodus.*
Chalicomys Kaup, 1832	*Chalicomys jaegeri.*
Chelodus Kaup, 1832	*Chelodus typus.*
† *Chloromys* (Meyer) Schlosser, 1884	*Chalicomys eseri.*
Conodontes Laugel, 1862	*Conodontes boisvilletti.*
† *Conodus* Gervais, 1867–'69	Emended form of *Conodontes.*
Diabroticus Pomel, 1848	*Diabroticus schmerlingii.*
Eucastor Leidy, 1858	*Castor tortus.*
Mylagaulus Cope, 1878	*Mylagaulus sesquipedalis.*
Palæocastor Leidy, 1869	*Steneofiber nebrascensis.*
Palaeomys Kaup, 1832	*Palaeomys castoroides.*
Sigmogomphius J. C. Merriam, 1896.	*Sigmogomphius lecontei.*
Steneofiber Geoffroy, 1834	———
Steneotherium Geoffroy, 1833	———
Trogontherium G. Fischer, 1809	*Trogontherium cuvieri, T. werneri.*

CASTOROIDIDÆ.

Castoroididæ J. A. Allen, Mon. N. Am. Rodentia, p. 419, Aug., 1877.

Name, authority, and date.	Type or included species.
Amblyrhiza Cope, 1868	*Amblyrhiza inundata.*
Castoroïdes Foster, 1838	*Castoroïdes ohioensis.*
† *Leptomylus* Cope, 1869	Misprint for *Loxomylus.*
Loxomylus Cope, 1869	*Loxomylus longidens.*

CAVIIDÆ.

Caviadæ Gray, London Medical Repository, XV, p. 304, April 1, 1821.
Hydrocharina Gray, Thomson's Ann. Philos., XXVI, p. 341, Nov., 1825.
Hydrochoeridæ Gill, Arrangement Fam. Mammals, p. 22, Nov., 1872.
Kerodontina Gervais, in D'Orbigny's Dict. Univ. d'Hist. Nat., XI, p. 204, 1849.

Name, authority, and date.	Type or included species.
Anchymis Ameghino, 1886	*Cardiodon leidyi.*
Anoëma F. Cuvier, 1809	Cavia cobaya.
? *Callodontomys* Ameghino, 1889	*Callodontomys vastatus.*
Capiguara Liais, 1872	New name for Hydrochœrus. (Considered preferable by Liais because derived from the Indian name.)

Cardiatherium Ameghino, 1883	*Cardiatherium dœringi.*
† *Cardiodon* Ameghino, 1885	*Cardiodon marshii, C. leidyi.* (See *Eucardiodon.*)
* *Cardiodus* Bravard, 1857	*Cardiodus waterhousii, C. medius, C. minus, C. dubius.*
Cardiomys Ameghino, 1885	*Cardiomys cavinus.*
Cavia Pallas, 1766	Cavia cobaya.
Caviodon Ameghino, 1885	*Caviodon multiplicatus.*
† **Ceratodon** Wagler, 1830	Emended form for Kerodon.
Cerodon Wagler, 1830	Emended form for Kerodon.
Cobaya Cuvier, 1817	Cavia cobaya.
Controcavia Burmeister, 1885	*Controcavia matercula.*
Diocartherium Ameghino, 1888	*Diocartherium australe.*
Dolichotis Desmarest, 1819	Cavia patachonica.
Eucardiodon Ameghino, 1891	New name for *Cardiodon.*
Galea Meyen, 1833	Galea musteloides.
Hydrochaerus Brisson, 1762	Sus hydrochoeris.
Kerodon F. Cuvier, 1823	The 'Moco' of Geoffroy.
Mara D'Orbigny, 1829	Dolichotis patagonica.
Microcavia Gervais & Ameghino, 1880.	*Microcavia typus, M. robusta, M. intermedia, M. dubia.*
Neoprocavia Ameghino, 1889	New name for *Procavia* Ameghino.
Oromys Leidy, 1853	*Oromys æsopi.*
Orthomyctera Ameghino, 1889	*Cavia rigens, Orthomyctera vaga, Dolichotis lacunosa, Orthomyctera lata.*
Palæocavia Ameghino, 1889	*Cavia impar, C. avita, Palæocavia pampaëa, P. minuta.*
Phugatherium Ameghino, 1887	*Phugatherium cataclisticum.*
Plexochœrus Ameghino, 1886	*Hydrochœrus paranensis.*
Prea Liais, 1872	New name for Cavia. (Preferred by Liais because native name.)
Procardiatherium Ameghino, 1885	*Procardiatherium simplicidens.*
† *Procavia* Ameghino, 1885	*Procavia mesopotamica.* (See *Neoprocavia.*)
Scavia Blumenbach, 1802	Modified form of Cavia.
Strata Ameghino, 1886	*Strata elevata.*

CHINCHILLIDÆ.

Chinchillidæ Bennett, Proc. Zool. Soc. London, 1833, p. 58.

‡ **Eriomyidæ** Burmeister, Syst. Uebersicht Thiere Brasil., I, p. 188, 1854.

‡ **Lagostomidæ** "Bonaparte, Synopsis Vert. Syst., 1837."

Viscachideæ Lesson, Nouv. Tableau Règne Animal, Mamm., p. 104, 1842.

Name, authority, and date.	Type or included species.
Briaromys Ameghino, 1889	*Briaromys trouessartianus.*
Callomys D'Orbigny & Geoffroy, 1830.	Callomys viscacia, Mus laniger, Callomys aureus.

Chinchilla Bennett, 1829	Mus laniger.
Colpostemma Ameghino, 1891	*Colpostemma sinuata.*
† *Epiblema* Ameghino, 1886	*Epiblema horridula.* (See *Neoepiblema.*)
Eriomys Lichtenstein, 1829	Eriomys chinchilla.
Euphilus Ameghino, 1889	*Euphilus ambrosettianus, E. kurtzii.*
Gyriabrus Ameghino, 1891	*Gyriabrus glutinatus.*
Lagidium Meyen, 1833	Lagidium peruanum.
Lagostomus Brookes, 1829	Lagostomus trichodactylus.
† **Lagotis** Bennett, 1833	Lagotis cuvieri.
Megamys D'Orb. & Laurillard, 1842	*Megamys patagonensis.*
Neoepiblema Ameghino, 1889	New name for *Epiblema* Ameghino.
Perimys Ameghino, 1887	*Perimys erutus, P. onustus.*
Pliolagostomus Ameghino, 1887	*Pliolagostomus notatus.*
Potamarchus Burmeister, 1885	*Potamarchus murinus.*
Prolagostomus Ameghino, 1887	*Prolagostomus pusillus, P. divisus, P. profluens, P. imperialis.*
Scotaeumys Ameghino, 1887	*Scotaeumys imminutus.*
Sphæramys Ameghino, 1887	*Sphæramys irruptus.*
Sphiggomys Ameghino, 1887	*Sphiggomys zonatus.*
Sphodromys Ameghino, 1887	*Sphodromys scalaris.*
Strophostephanos Ameghino, 1891	*Strophostephanos iheringii.*
Tetrastylus Ameghino, 1886	*Megamys ? laevigatus.*
Vizcacia[1] Schinz, 1824 (?)	Vizcacia pamparum.

DASYPROCTIDÆ.

Agoutidæ GRAY, London Medical Repository, XV, p. 304, April 1, 1821.

‡ **Chloromina** GERVAIS, in D'Orbigny's Dict. Univ. d'Hist. Nat., XI, p. 204, 1849.

‡ **Cœlogenina** GERVAIS, in D'Orbigny's Dict. Univ. d'Hist. Nat., XI, p. 204, 1849.

‡ **Cœlogenyidæ** BURMEISTER, Syst. Uebers. Thiere Brasil., I, p. 227, 1854.

Dasyporcina GRAY, Thomson's Ann. Philos., XXVI, p. 341, Nov., 1825.

Dasyproctina GRAY, List Spec. Mamm. Brit. Mus., pp. xxv, 124, 1843.

Dasyproctidæ BONAPARTE, Conspectus Syst. Mastozoologiæ, 1850.

Name, authority, and date.	Type or included species.
Agouti Lacépède, 1801	Agouti paca (= Mus paca Linnæus).
Cloromis F. Cuvier, 1812	Includes the agoutis.
Cœlogenus[2] F. Cuvier, 1807	Cœlogenus subniger, C. fulvus.
Cutia Liais, 1872	New name for Dasyprocta Illiger.
Dasyprocta Illiger, 1811	Cavia aguti, C. acuschy.
Genyscœlus Liais, 1872	Emended form for Cœlogenus.
Osteopera Harlan, 1825	Osteopera platycephala.
Paca Fischer, 1814	Paca maculata (= Cavia paca).
Platypyga Illiger, 1811	(?)

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[1] Viscacia Rafinesque, 1815 (nomen nudum), Rengger, 1830.

[2] Cælogenus (Griffith, 1827); Caelogenys (Agassiz, 1846); Coelogenys (Illiger, 1811); Genyscœlus (Liais, 1872).

DINOMYIDÆ.

Dinomyidæ ALSTON, Proc. Zool. Soc. London, 1876, p. 96.

Dinomys Peters, 1873.........	Dinomys branickii.

DIPODIDÆ.[1]

Dipodina BONAPARTE, "Synopsis Vert. Syst., 1837."
Dipodidæ WATERHOUSE, Ann. & Mag. Nat. Hist., X, p. 203, Nov., 1842.
Dipodæ GERVAIS, in D'Orbigny's Dict. Univ. d'Hist. Nat., XI, p. 203, 1849.
Dipsidæ GRAY, London Medical Repository, XV, p. 303, April 1, 1821.
‡ **Gerboidæ** WATERHOUSE, Charlesworth's Mag. Nat. Hist., III, p. 186, April, 1839.
‡ **Ierboidæ** GRAY, Thomson's Am. Philos., XXVI, p. 341, Nov., 1825.
‡ **Jaculina** CARUS, Handbuch Zool., p. 101, 1868.
‡ **Jaculidæ** GILL, Arrangement Fam. Mamm., p. 20, Nov., 1872.
Sminthinæ ALSTON, Proc. Zool. Soc. London, 1876, p. 80.
Sminthidæ SCHULZE, Schrift. Nat. Ver. Harz., Wernigerode, V, p. 24, 1890.
Zapodidæ COUES, Bull. U. S. Geol. & Geog. Surv. Terr., I, 2d ser., No. 5, p. 253, 1875.

Name, authority, and date.	Type or included species.
Allactaga Cuvier, 1836........	Dipus allactaga.
Beloprymnus Gloger, 1841....	New name for Allactaga.
Cuniculus Brisson, 1762.......	Dipus allactaga.
Dipus Schreber, 1782..........	Dipus jaculus, D. sagitta, D. cafer, D. meridianus, D. tamaricinus.
Euchoreutes W.L.Sclater, 1891.	Euchoreutes naso.
† **Halticus** Brandt, 1844.........	Dipus halticus.
Haltomys Brandt, 1844........	Dipus aegyptius, D. hirtipes, D. macrotarsus, D. mauritanicus.
Jaculus Erxleben, 1777........	Jaculus orientalis, J. giganteus, J. torridarum.
† **Meriones** Cuvier, 1825	Dipus americanus.
Platycercomys Brandt, 1844..	Dipus platyurus.
Pygeretmus Gloger, 1841......	Dipus platyurus.
Scarturus Gloger, 1841........	4-toed species of Dipus.
Scirteta Brandt, 1844..........	(?)
Scirtetes Wagner, 1841........	New name for Allactaga Cuvier.
Scirtomys Brandt, 1844.......	Alactaga tetradactylus (= Scarturus Gloger, 1841).
Scirtopoda Brandt, 1844......	Dipus halticus, D. aegyptius, D. hirtipes, D. macrotarsus, D. mauritanicus (= Halticus + Haltomys).

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[1] Sminthus represents the subfamily Sminthinæ, Zapus the Zapodinæ, and the other genera belong to the Dipodinæ.

Sminthus Keys. & Blasius, 1840.	Sminthus nordmanni.
Yerbua Forster, 1778	Yerbua tarsata (= Tarsius spectrum), Y. sibirica, Y. capensis (= Pedetes cafer), Mus meridianus, Yerbua kanguru (= Macropus giganteus); Mus longipes, M. jaculus, M. sagitta.
Zapus Coues, 1875	Dipus hudsonius.

EOCARDIDÆ.

Eocardidæ Ameghino, Revista Argentina, I, Ent. 3, p. 145, Junio, 1891.

Name, authority, and date.	Type or included species.
Dicardia Ameghino, 1891	*Dicardia maxima, D. modica, D. excavata.*
Eocardia Ameghino, 1887	*Eocardia montana.*
Hedymys Ameghino, 1887	*Hedymys integrus.*
Phanomys Ameghino, 1887	*Phanomys mixtus.*
Procardia Ameghino, 1891	*Eocardia eliptica.*
Schistomys Ameghino, 1887	*Schistomys erro.*
Tricardia Ameghino, 1891	*Eocardia divisa.*

ERETHIZONTIDÆ.

‡ **Cercolabina** GRAY, List Spec. Mamm. Brit. Mus., pp. xxiv, 123, 1843.

‡ **Cercolabinæ** GILL, Arrangement Fam. Mamm., p. 22, Nov., 1872.

‡ **Cercolabidæ** AMEGHINO, Enum. Sist. Mam. Fós. Patagonia Austral, p. 9, Dic. 1887.

Chætomyinæ THOMAS, Proc. Zool. Soc. London, 1896, 1026 (1897).

Coendidæ TROUESSART, Cat. Mamm. tam viv. quam foss., fasc. III, p. 619, Oct., 1897.

Erethizontina BONAPARTE, Conspectus Syst. Mastozoologiæ, 1850.

Erethizontidæ THOMAS, Proc. Zool. Soc. London, 1896, 1025 (Apr., 1897).

‡ **Sphingurinæ** ALSTON, Proc. Zool. Soc. London, 1876, p. 93.

‡ **Synetherina** GERVAIS, in D'Orbigny's Dict. Univ. d'Hist. Nat., XI, p. 204, 1849.

‡ **Synetherinæ** TROUESSART, Cat. Mamm. Viv. et Foss., Rongeurs, p. 182, 1881.

Name, authority, and date.	Type or included species.
Acaremys Ameghino, 1887	*Acaremys murinus, A. minutus, A. minutissimus.*
Cercolabes Brandt, 1835	New name for Coendou Lacépède, 1801.
Chætomys Gray, 1843	Hystrix subspinosus.
Coendou[1] Lacépède, 1801	Hystrix prehensilis.
Echinoprocta Gray, 1865	Erethizon rufescens.
Echinothrix Brookes, 1828	Hystrix dorsata.

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[1] Emended to Coendous (Temminck, 1820); Coëndus (Illiger, 1815); Çœndus (Rafinesque, 1815); Cuandu (Liais, 1872).

Erethizon[1] F. Cuvier, 1822	Hystrix dorsata.
Hystricops Leidy, 1858	*Hystrix venustus.*
Onychura Brookes, 1828	Onychura spinosa.
Plectrochœrus Pictet, 1843	Plectrochœrus moricandi.
Sciamys Ameghino, 1887	*Sciamys principalis, S. varians.*
Sincœtherus[2] F. Cuvier, 1822	Hystrix prehensilis.
Sphiggurus[3] F. Cuvier, 1822	Sphiggurus spinosus,
Steiromys Ameghino, 1887	*Steiromys detentus, S. duplicatus.*

GEOMYIDAE.

Geomyina BONAPARTE, Conspectus Syst. Mastozoologiæ, 1850.
Geomyinæ BAIRD, Mamm. N. Am., pp. xxx, 366, 1857.
Geomyidæ GILL, Arrangement Fam. Mamm., p. 21, Nov., 1872.
‡ **Pseudotomina** GRAY, Thomson's Ann. Philos., XXVI, p. 342, 1825.
‡ **Pseudostomidæ** GERVAIS, Ann. Sci. Nat., Paris, 3^e ser., XX, p. 245, 1853.

Name, authority, and date.	Type or included species.
Ascomys Lichtenstein, 1825	Ascomys canadensis (= Mus bursarius).
Cratogeomys Merriam, 1895	Geomys merriami.
Diplostoma Rafinesque, 1817	Diplostoma fusca (= Mus bursarius).
Geomys Rafinesque, 1817	Geomys pinetis (= Mus tuza Ord).
Gymnoptychus Cope, 1873	*Gymnoptychus chrysodon, G. nasutus, G. trilophus,* and *G. minutus.*
Heliscomys Cope, 1873	*Heliscomys vetus.*
Heterogeomys Merriam, 1895	Geomys hispidus.
Macrogeomys Merriam, 1895	Geomys heterodus.
Orthogeomys Merriam, 1895	Geomys scalops.
Oryctomys Eydoux & Gervais, 1836.	Five subgenera: Diplostoma, Saccophorus, Saccomys, Poephagomys, Ctenomys.
Pappogeomys Merriam, 1895	Geomys bulleri.
Platygeomys Merriam, 1895	Geomys gymnurus.
Pseudostoma Say, 1823	Pseudostoma bursaria.
Saccophorus Kuhl, 1820	Mus bursarius.
Thomomys Maximilian, 1839	Thomomys rufescens.
*?**Tucanus** Rafinesque, 1815	Nomen nudum?
Zygogeomys Merriam, 1895	Zygogeomys trichopus.

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[1] Emended to Erethison (Waterhouse, 1839); Eretison (McMurtrie, 1831); Eretizon (Cuvier, 1825); Erythizon (Alston, 1876).

[2] Emended to Sinetheres (Agassiz, 1842); Sincœtherus (Cuvier, 1825); Synætheres (Gervais, 1859); Synetheres (G. Cuvier, 1829); Syncœtheres (Lund, 1839).

[3] Emended to Sphingurus (Waterhouse, 1848); Spiggurus (Gray, 1847); Spigurus (Swainson, 1835).

GLIRIDÆ.[1]

Gliridæ THOMAS, Proc. Zool. Soc. London, 1896, 1016 (1897).
‡ **Myosidæ** GRAY, London Medical Repository, XV, p. 303, April 1, 1821.
‡ **Myoxidæ** WATERHOUSE, Charlesworth's Mag. Nat. Hist., III, p. 184, April, 1839.
Platacanthomyinæ ALSTON, Proc. Zool. Soc. London, 1876, p. 81.

Name, authority, and date.	Type or included species.
Bifa Lataste, 1885.	Bifa lerotina.
Brachymys Meyer, 1847.	New name for *Micromys* Meyer, 1846.
Cænomys (Bravard MS.) Lydekker, 1885.	*Cænomys typus* (= *Myoxus murinus*).
Claviglis Jentink, 1888.	Claviglis crassicaudatus.
Eliomys Wagner, 1843.	Myoxus melanurus.
Glis Brisson, 1762.	Sciurus glis.
Graphiurus F. Cuvier, 1838.	Graphiurus capensis.
*†*Micromys* Meyer, 1846.	*Micromys ornatus.* (See *Brachymys.*)
Muscardinus Kaup, 1829.	Myoxus muscardinus.
Myoxus Schreber, 1782.	Myoxus glis, M. dryas, M. nitela, M. muscardinus.
Platacanthomys Blyth, 1859.	Platacanthomys lasiurus.
Typhlomys Milne Edwards, 1877.	Typhlomys cinereus.

HETEROMYIDÆ.

Dipodomyna GERVAIS, Ann. Sci. Nat., Paris, 3ème ser., XX, p. 245, 1853.
Dipodomyinæ COUES, Proc. Acad. Nat. Sci. Phila., 1875, p. 277.
Heteromyina GRAY, Proc. Zool. Soc. London, 1868, p. 201.
Heteromyinæ ALSTON, Proc. Zool. Soc. London, 1876, p. 88.
Heteromyidæ ALLEN, Bull. Am. Mus. Nat. Hist. N.Y., V, p. 233, Sept. 21, 1893.
Perognathidinæ COUES, Proc. Acad. Nat. Sci. Phila., 1875, pp. 277–278.
‡ **Saccomyna** GRAY, List. Spec. Mamm. Brit. Mus., pp. xxiv, 120, 1843.
‡ **Saccomyidæ** BAIRD, Mamm. N. Am., pp. xxx, 365, 1857.

Name, authority, and date.	Type or included species.
Abromys Gray, 1868	Abromys lordi.
Chætodipus Merriam, 1889	Perognathus spinatus.
Cricetodipus Peale, 1848	Cricetodipus parvus.
Dasynotus Wagler, 1830	Mus anomalus.
Dipodomys Gray, 1841	Dipodomys phillipii
Dipodops Merriam, 1890	Dipodomys agilis.
? *Entoptychus* Cope, 1878	*Entoptychus cavifrons, E. planifrons, E. crassiramis.*
Heteromys Desmarest, 1817	Mus anomalus.
Macrocolus Wagner, 1844	Macrocolus halticus.

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[1] Platacanthomys and Typhlomys belong to the Platacanthomyinæ, the others to the Glirinæ.

Microdipodops Merriam, 1891.	Microdipodops megacephalus.
Otognosis Coues, 1875.........	Otognosis longimembris.
Perodipus Fitzinger, 1867.....	Dipodomys agilis.
Perognathus Maximilian, 1839.	Perognathus fasciatus.
Pleurolicus Cope, 1878..........	*Pleurolicus sulcifrons.*
Saccomys F. Cuvier, 1823.....	Saccomys anthophilus.

HYSTRICIDAE.

Histricidæ Gray, London Med. Repository, XV, p. 304, April 1, 1821.
Hystrixideæ Lesson, Nouv. Tableau Règne Animal, Mamm., p. 96, 1842.

Name, authority, and date.	Type or included species.
Acantherium Gray, 1847... ..	Acanthion javanicum, A. flemingii.
Acanthion Cuvier, 1822.......	Acanthion javanicum.
Acanthochoerus Gray, 1866...	Acanthochoerus bartlettii, A. grotei.
* **Eucritus** G. Fischer, 1817......	(?)
Atherurus F. Cuvier, 1829.....	Hystrix fasciculata.
Hystricotherium Croizet, 1853 ...	*Hystrix refossa.*
Hystrix Linnæus, 1758........	Hystrix cristata, H. prehensilis, H. dorsata, H. macroura, H. brachyura.
Lamprodon Wagner, 1848.......	*Lamprodon primigenius.*
Œdocephalus Gray, 1866......	Acanthion cuvieri.
* *Oreomys* Aymard, 1854.........	*Oreomys claveris.*
Trichys Günther, 1876........	Trichys lipura.

ISCHYROMYIDÆ.

Ischyromyidæ Alston, Proc. Zool. Soc. London, 1876, pp. 67, 78.

Name, authority, and date.	Type or included species.
Colonomys Marsh, 1872..........	*Colonomys celer.*
Colotaxis Cope, 1873............	*Colotaxis cristatus.*
Ischyromys Leidy, 1856.........	*Ischyromys typus.*
? *Mysops* Leidy, 1871.............	*Mysops minimus.*
Paramys Leidy, Nov. 28, 1871..	*Paramys delicatus, P. delicatior, P. delicatissimus.*
Pseudotomus Cope, 1872.........	*Pseudotomus hians.*
Sciuravus Marsh, June 21, 1871.	*Sciuravus nitidus, S. undans.*
? *Sciuromys* Schlosser, 1884.......	*Sciuromys cayluxi.*
Syllophodus Cope, 1881.........	New name for *Mysops* Leidy, 1871 (erroneously said to be preoccupied).
Taxymys Marsh, 1872...........	*Taxymys lucaris.*
Tillomys Marsh, 1872...........	*Tillomys senex, T. parvus.*

LEPORIDÆ.

Lagidæ Schulze, Helios, XIV, p. 82, 1897.
Leporidæ Gray, London Medical Repository, XV, p. 304, April 1, 1821.
Lepusidæ Gervais, Ann. Sci. Nat., 3^me^ ser., XX, p. 246, 1853.

Name, authority, and date.	Type or included species.
Caprolagus Blyth, 1845	Lepus hispidus.
Chionobates Kaup, 1829	Lepus variabilis, L. borealis.
† **Cuniculus** Gloger, 1841	Lepus cuniculus.
Eulagos Gray, 1867	Lepus mediterraneus, L. judææ.
† **Hydrolagus** Gray, 1867	Lepus aquaticus (type), L. palustris. (See Limnolagus).
Lagopsis Rafinesque, 1815	Nomen nudum.
* **Lagos** Brookes, 1828	Lepus arcticus.
Lagotherium Croizet, 1853	*Lepus issiodorensis, L. neschersensis.*
Lepus Linnæus, 1758	Lepus timidus, L. cuniculus, L. capensis, L. brasiliensis.
Limnolagus Mearns, 1897	New name for Hydrolagus Gray, 1867.
Macrotolagus Mearns, 1895	Lepus alleni.
Microlagus Trouessart, 1897	Lepus cinerascens.
Oryctolagus Lilljeborg, 1873	Lepus cuniculus.
Palaeolagus Leidy, 1856	*Palaeolagus haydeni.*
Panolax Cope, 1874	*Panolax sanctæfidei.*
Praotherium Cope, 1871	*Praotherium palatinum.*
Romerolagus Merriam, 1896	Romerolagus nelsoni.
Sylvilagus Gray, 1867	Lepus nanus (= L. americanus), L. artemisia (= L. nuttalli), L. bachmani.
Tapeti Gray, 1867	Lepus brasiliensis.
Tricium Cope, 1873	*Tricium avunculus, T. leporinum, T. paniense.*

LOPHIOMYIDÆ.

Lophiomyidæ GILL, Arrangement Fam. Mamm., p. 20, Nov., 1872.

Lophiomys Milne Edwards, Feb. 6, 1867	Lophiomys imhausii.
Phractomys Peters, Feb., 1867	Phractomys aethiopicus.

MURIDÆ.

CRICETINÆ.

Cricetina GRAY, Thomson's Ann. Philos., XXVI, p. 342, Nov., 1825.

Cricetinæ ALSTON, Proc. Zool. Soc. London, 1876, p. 82.

Cricetidæ ZITTEL, Handbuch d. Palæontologie, IV, 2te Lief., p. 534, 1893.

Hesperomyidæ AMEGHINO, Mam. Fós., in Actas Acad. Nac. Ciencias, Córdoba, VI, p. 109, 1889.

Nesomyinæ FORSYTH MAJOR, Proc. Zool. Soc. London, 1897, p. 718.

Sigmodontinæ THOMAS, Proc. Zool. Soc. London, 1896, 1019 (1897).

Name, authority, and date.	Type or included species.
Abrothrix Waterhouse, 1837	Mus (Abrothrix) longipilis.
Acromys ('Wagner') Trouessart, 1881	Synonym of Drymomys.
Akodon Meyen, 1833	Akodon boliviense.
Baiomys True, 1894	Hesperomys taylori.

Blarinomys Thomas, 1896	Oxymycterus breviceps.
Brachytarsomys Günther, 1875	Brachytarsomys albicauda.
Brachyuromys Forsyth Major, 1896	Brachyuromys ramirohitra.
† **Calomys** Waterhouse, 1837	Mus (Calomys) bisulcatus.
Chilomys Thomas, 1897	Oryzomys instans.
Cricetodon Lartet, 1851	*Cricetodon sansaniensis*, *C. medium*, *C. minus*.
Cricetulus Edwards, 1867	Cricetulus griseus.
Cricetus Zimmermann, 1777	Le Hamster.
Decticus Aymard, 1853	*Decticus antiquus*.
Deilemys Saussure, 1860	Hesperomys toltecus.
Drymomys Tschudi, 1844	Drymomys parvulus.
Eligmodontia[1] F. Cuvier, 1837	Eligmodontia typus.
Eliurus Edwards 1885	Eliurus myoxinus.
? *Eomys* Schlosser, 1884	*Eomys zitteli*.
Eumys Leidy, 1856	*Eumys elegans*.
Euneomys Coues, 1874	Reithrodon chinchilloides.
Gymnuromys Forsyth Major, 1896	Gymnuromys roberti.
Habrothrix Wagner, 1843	Emended form for Abrothrix.
Hallomys Jentink, 1879	Hallomys audeberti.
Hamster Lacépède, 1801	Hamster nigricans.
Heligmodontia Agassiz, 1846	Emended form for Eligmodontia.
Hesperomys Waterhouse, 1839.	Mus bimaculatus.
Holochilomys ('Brandt') Peters, 1861.	Mus aquaticus, M. squamipes (modified form of Holochilus).
Holochilus Brandt, 1835	Mus (Holochilus) leucogaster, M. anguya.
Hypogeomys Grandidier, 1869.	Hypogeomys antimena.
Ichthyomys Thomas, 1893	Ichthyomys stolzmanni.
* *Lithomys* Meyer, 1846	*Lithomys parvulus*.
Megalomys Trouessart, 1881	Mus pilorides.
*† *Micromys* Aymard, 1848	*Micromys minutus*. (See *Myotherium*.)
* *Myarion* Pomel, 1854	*Myarion antiquum*, *M. musculoides*, *M. minutum*, *M. angustidens*.
Myotherium Aymard, 1853	New name for *Micromys* Aymard, 1848.
Myoxomys Tomes, 1861	Hesperomys (Myoxomys) salvinii.
Mystromys Wagner, 1841	Mystromys albipes.
Necromys Ameghino, 1889	*Necromys conifer*.
Nectomys Peters, 1861	Mus squamipes, Nectomys apicalis.
† **Neomys** Gray, 1873	Neomys panamensis.
Neotomys Thomas, 1894	Neotomys ebriosus.
Nesomys Peters, 1870	Nesomys rufus.
Notiomys Thomas, 1890	Hesperomys (Notiomys) edwardsii.
Nyctomys Saussure, 1860	Hesperomys sumichrasti.
Ochetodon Coues, 1874	Mus humilis.

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[1] Emended to *Eligmodon* (Thomas, 1896), *Elimodon* (Fitzinger, 1867), and *Heligmodontia* (Agassiz, 1846).

Onychomys Baird, 1857	Hypudæus leucogaster.
* ?**Orycteromys** Pictet, 1842	(?)
Oryzomys Baird, 1857	Mus palustris.
Oxymycterus Waterhouse, 1837	Mus (Oxymycterus) nasutus.
* **Pelamys** Jourdan, 1867 (?)	Pelamys remifer.
Peromyscus Gloger, 1841	Peromyscus arboreus (= Cricetus myoides).
Phyllotis Waterhouse, 1837	Mus (Phyllotis) darwini.
Reithrodon[1] Waterhouse, 1837.	Reithrodon typicus, R. cuniculoïdes.
Reithrodontomys Giglioli, 1873	Reithrodon from North America.
Rhipidomys Tschudi, 1844	Hesperomys leucodactylus.
Scapteromys Waterhouse, 1837	Mus (Scapteromys) tumidus.
Sigmodon Say & Ord, 1825	Sigmodon hispidum.
Sigmodontomys J. A. Allen, 1897.	Sigmodontomys alfari.
Sitomys Fitzinger, 1867	Cricetus myoides.
Thomasomys Coues, 1884	Hesperomys cinereus.
Trinodontomys Rhoads, 1894.	Sitomys insolatus.
Tylomys Peters, 1866	Hesperomys (Tylomys) nudicaudus.
Vesperimus Coues, 1874	Hesperomys (Vesperimus) leucopus.
Vesperomys ('Coues') Alston, 1880.	Modified form of Vesperimus.
Zygodontomys J. A. Allen, 1897	Oryzomys cherriei.

DENDROMYINÆ.

Dendromyinæ Alston, Proc. Zool. Soc. London, 1876, p. 82.

Deomyinæ Lydekker, in Flower & Lydekker's Mamm., Living & Extinct, p. 473, 1891.

Name, authority, and date.	Type or included species.
Dendromus A. Smith, 1829	Dendromus typus.
Deomys Thomas, 1888	Deomys ferrugineus.
Leimacomys[2] Matschie, 1893	Leimacomys büttneri.
Malacothrix Wagner, 1843	New name for Otomys Smith, 1834.
† **Otomys** Smith, 1834	Otomys typicus, O. albicaudatus.
Steatomys Peters, 1846	Steatomys pratensis.

GERBILLINÆ.

Gerbillina Gray, Thomson's Ann. Philos., XXVI, p. 342, Nov., 1825.

Gerbillidæ De Kay, Nat. Hist. New York, Zool., pt. I, pp. xv, 70, 1842.

Name, authority, and date.	Type or included species.
Amphiaulacomys Lataste, 1882.	Rhombomys pallidus.
Dipodillus Lataste, 1881	Gerbillus simoni.
Endecapleura Lataste, 1882	Gerbillus garamantis.
Gerbillus Desmarest, 1804	Gerbillus ægyptius, G. canadensis, G. pyramidum.
Hendecapleura Thomas, 1883	Emended form for Endecapleura.

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[1] Emended to Rhithrodon (Lydekker, 1891), Rithrodon (Agassiz, 1846).

[2] Emended to Limacomys (Lydekker, 1894).

Meriones Illiger, 1811	Dipus tamaricinus, D. meridianus.
Pachyuromys Lataste, 1880	Pachyuromys duprasi.
Psammomys Cretzschmar, 1828.	Psammomys obesus.
Rhombomys Wagner, 1841	Rhombomys pallidus.
Tatera Lataste, 1882	Gerbillus indicus.

HYDROMYINÆ.

Hydromyina Gray, Thomson's Ann. Philos., XXVI, p. 341, Nov., 1825.
Hydromyinæ Alston, Proc. Zool. Soc. London, 1876, p. 80.
Hydromysideæ Lesson, Nouv. Tabl. Règne Animal, Mamm., p. 125, 1842.

Name, authority, and date.	Type or included species.
Chrotomys Thomas, 1895.	Chrotomys whiteheadi.
Hydromys Geoffroy, 1805	Mus coypus, Hydromys chrysogaster, H. leucogaster.
Xeromys Thomas, 1889	Xeromys myoides.

MICROTINÆ.

‡ **Arvicolidæ** Gray, London Med. Repository, XV, p. 303, April 1, 1821.
‡ **Ellobiinae**[1] Gill, Arrangement Fam. Mamm., p. 20, Nov., 1872.
Lemnina Gray, Thomson's Ann. Philos., XXVI, p. 342, Nov., 1825.
Microtinæ Rhoads, Am. Nat., XXIX, p. 940, Oct., 1895.
Miller, N. Am. Fauna, No. 12, p. 8, July, 1896.
‡ **Ondatrina** Gray, Thomson's Ann. Philos., XXVI, p. 341, Nov., 1825.

Name, authority, and date.	Type or included species.
Agricola Blasius, 1857	Arvicola agrestis.
Alticola Blanford, 1881	Arvicola stoliczkanus.
Alviceola Blainville, 1817	'Le genre campagnol.' (Misprint for Arvicola?)
Ammomys Bonaparte, 1831	New name for Psammomys Le Conte.
Anaptogonia Cope, 1871	*Arvicola hiatidens.*
Anteliomys Miller, 1896	Microtus chinensis.
Arvicola Lacépède, 1801	Mus amphibius (= M. terrestris Linn.)
Aulacomys Rhoads, 1894	Aulacomys arvicoloides.
Bicunedens Hodgson, 1863	Bicunedens perfuscus (nomen nudum = Neodon sikimensis).
Borioikon Poliakoff, 1881	Myodes torquatus.
Brachyurus Fischer, 1813	Mus arvalis, M. rutilus, M. amphibius, M. lemmus, M. torquatus, M. alliarius, Brachyurus blumenbachii, B. fulvus, B. niloticus.
Bramus Pomel, 1892	*Bramus barbarus.*
† **Campicola** Schulze, 1890	Arvicola arvalis, A. subterraneus, A. campestris.
Chilotus Baird, 1857	Arvicola oregoni.

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[1] Preoccupied by Ellobiinæ, a subfamily of Mollusks. See Adams, Gen. Recent Moll., II, p. 237, 1858.

* **Chthonoergus** Nordmann, 1839.	Mus murinus (= M. talpinus Pallas).
† **Cuniculus** Wagler, 1830	Mus lemmus, M. torquatus (type), M. aspalax. (See Borioikon, Dicrostonyx, Misothermus, Tylonyx.)
Dicrostonyx Gloger, 1841	Mus hudsonius?
† **Ellobius** Fischer, 1814	Mus talpinus (type), Ellobius zocor (= Mus aspalax), Mus capensis, M. hudsonius.
Eothenomys Miller, 1896	Microtus melanogaster.
Eremiomys Poliakoff, 1881	Georychus luteus, Mus lagurus (type).
Evotomys Coues, 1874	Mus rutilus.
Fiber Cuvier, 1800	Castor zibethicus.
*† **Glareolus** Oken, 1816	Mus arvalis, M. campestris?
Hemiotomys Sélys-Longchamps, 1836.	Arvicola fulvus (= A. arvalis), A. amphibius (= A. terrestris).
Hyperacrius Miller, 1896	Microtus fertilis.
Hypudaeus Illiger, 1811	Mus lemmus, M. amphibius (= M. terrestris), M. arvalis.
Isodelta Cope, 1871	*Arvicola speothen.*
Lagurus Gloger, 1841	Lagurus migratorius (= Mus lagurus Pall. ?)
Lasiopodomys Lataste, 1887	Arvicola brandti.
Lemmomys Lesson, 1842	Mus talpinus.
* **Lemmus** Link, 1795	Mus socialis, M. lagurus, M. lemmus (type), M. torquatus, M. glareolus, M. hudsonius.
Microtus Schrank, 1798	Mus terrestris (= M. arvalis Pall., type), M. amphibius (= M. terrestris Linn.), M. gregarius (= M. arvalis Pall. ?)
† **Micrurus** Forsyth Major, 1876.	Arvicola nebrodensis.
Mictomys True, 1894	Mictomys innuitus.
Misothermus Hensel, 1855	Myodes torquatus.
Mussascus Oken, 1816	Ondatra americana (= Castor zibethicus).
Mynomes[1] Rafinesque, 1817	Mynomes pratensis (= Arvicola pennsylvanicus).
[**Myocastor** Kerr, 1792	Mus Myocaster coypus (type), Mus M. zibethicus. (See Octodontidæ.)]
Myodes Pallas, 1811	Mus lemmus, M. torquatus, M. lagurus, M. oeconomus, M. arvalis, M. saxatilis, M. gregalis, M. socialis, M. alliarius, M. rutilus.
* *Myolemmus* Pomel, 1854	*Myolemmus ambiguus.*
Neodon Hodgson, 1849	Neodon sikimensis.
Neofiber True, 1884	Neofiber alleni.

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[1] Emended to Myonomes (Coues, 1874).

Ochetomys Fitzinger, 1867	Mus amphibius, Hypudæus pertinax, Arvicola destructor, Mus terrestris, Hypudæus nageri, Arvicola monticola, A. americanus.
* **Ondatra** Link, 1795	Ondatra coypus, O. zibethicus.
† **Paludicola** Blasius, 1857	Arvicola amphibius (= A. terrestris), A. nivalis, A. ratticeps.
Pedomys Baird, 1857	Arvicola austerus.
* **Phaiomys** Blyth, 1863	Phaiomys leucurus (= Microtus blythi Blan.)
Phenacomys Merriam, 1889	Phenacomys intermedius.
Pinemys Lesson, 1836	Psammomys pinetorum.
Pitymys McMurtrie, 1831	New name for Psammomys Le Conte.
† **Praticola** Fatio, 1867	Arvicola amphibius (= A. terrestris), A. nivalis, A. arvalis, A. ratticeps, A. campestris.
† **Psammomys** Le Conte, 1830	Psammomys pinetorum. (See Ammomys, Pinemys, Pitymys.)
* **Simotes** Fischer, 1829 (?)	(?)
† **Sylvicola** Fatio, 1867	Arvicola agrestis.
Synaptomys Baird, 1857	Synaptomys cooperi.
† **Terricola** Fatio, 1867	Arvicola subterraneus, A. savii.
Tetramerodon Rhoads, 1894	Arvicola tetramerus.
Tylonyx Schulze, 1897	Mus torquatus.

MURINÆ.

Muridæ GRAY, London Medical Repository, XV, p. 303, April 1, 1821.
Musideæ LESSON, Nouv. Tableau Règne Animal, Mamm., p. 134, 1842.

Name, authority, and date.	Type or included species.
Acanthomys Lesson, 1842	Mus setifer, M. alexandrinus, Acanthomys perchal, Mus platythrix, M. hispidus.
† **Acanthomys** Gray, 1867	Acanthomys leucopus.
Acomys Geoffroy, 1838	Mus cahirinus.
Acosminthus Gloger, 1841	Mus cahirinus, M. dimidiatus.
Apodemus Kaup, 1829	Mus agrarius.
Arvicanthis Lesson, 1842	Lemmus niloticus.
Bandicota Gray, 1873	Bandicota gigantea.
Batomys Thomas, 1895	Batomys grantii.
Carpomys Thomas, 1895	Carpomys melanurus.
Chiropodomys Peters, 1868	Chiropodomys penicillatus.
Chiruromys Thomas, 1888	Chiruromys forbesi.
Conilurus Ogilby, 1838	Conilurus destructor.
Crateromys Thomas, 1895	Phlœomys schadenbergi.
Craurothrix Thomas, 1895	New name for Echiothrix Gray, 1867.
Cricetomys Waterhouse, 1840	Cricetomys gambianus.
Dasymys Peters, 1875	Dasymys gueinzii.

† **Echiothrix**[1] Gray, 1867	Echiothrix leucura. (See Craurothrix.)
? *Elomys* Aymard, 1848	*Elomys priscus.*
Epimys Trouessart, 1881	'Gymnomys et Acanthomys p. Gray, 1867' (57 species, including Mus caraco, decumanus, rattus, etc.).
Euchætomys Fitzinger, 1867	Mus palmarum, M. novaræ, M. setifer, M. perchal, M. kok, M. hardwickii, M. rufescens, M. ellioti, M. lepidus, M. vittatus, M. pumilio, M. parduleus, M. zebra, Rattus donovani.
Golunda Gray, 1837	Golunda ellioti, G. meltada, Mus barbara.
Gymnomys Gray, 1867	Mus (Gymnomys) celebensis.
Hapalomys Blyth, 1859	Hapalomys longicaudatus.
† **Hapalotis** Lichtenstein, 1829	Hapalotis albipes.
Heliomys Gray, 1873	Heliomys jeudei.
Isomys Sundevall, 1842	Mus variegatus (=Lemmus niloticus).
† **Lasiomys** Peters, 1866	Lasiomys afer. (See Lophuromys.)
Leggada Gray, 1837	Leggada booduga, Mus platythrix.
Lemniscomys Trouessart, 1881	Mus barbarus, pulchellus, zebra, lineatus, lineato-affinis, pumilio, trivirgatus, dorsalis, univittatus.
† *Lophiomys* Depéret, 1890	*Lophiomys pyrenaicus.* (See *Trilophomys*).
Lophuromys Peters, 1874	New name for Lasiomys Peters, 1866.
Malacomys Edwards, 1877	Malacomys longipes.
Mastacomys Thomas, 1882	Mastacomys fuscus.
Micromys Dehne, 1841	Micromys agilis.
Murinus Rafinesque, 1815	Nomen nudum.
Mus Linnæus, 1758	Mus porcellus, M. leporinus, M. lemmus, M. marmota, M. monax, M. cricetus, M. terrestris, M. amphibius, M. rattus, M. musculus, M. avellanarius, M. sylvaticus, M. striatus, M. longipes, M. jaculus, M. volans.
Musculus Rafinesque, 1814	Musculus frugivorus, M. dichrurus. (Modified form, proposed to supercede Mus).
Nannomys Peters, 1876	Mus (Nannomys) setulosus.
Nesokia Gray, 1842	Mus hardwickii.
Notomys Lesson, 1842	Dipus mitchellii.
Pelomys Peters, 1852	Mus (Pelomys) fallax.
Pithecheir[2] Cuvier, 1838	Pithecheir melanurus.
Pogonomys Edwards, 1877	Mus (Pogonomys) macrourus.

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[1] Echinothrix Alston, 1876.

[2] Emended to Pitcheir (Schinz, 1845), Pithechir (Jentink, 1892), Pithechirus (Agassiz, 1842), and Pithecochirus (Gloger, 1841).

Pseudoconomys Rhoads, 1896.	Mus (Pseudoconomys) proconodon.
Pseudomys Gray, 1832........	Pseudomys australis.
Rattus Zimmermann, 1777.....	Rattus somnolentus, R. migrans.
† **Saccostomus** Peters, 1846.....	Saccostomus campestris.
Spalacomys Peters, 1861......	Spalacomys indicus.
? **Tenomys** Rafinesque, 1815....	Nomen nudum.
Trilophomys Depéret, 1892......	New name for *Lophiomys* Depéret, 1890.
Uromys Peters, 1867..........	Mus macropus.
Vandeleuria Gray, 1842.......	Mus oleraceus.

NEOTOMINÆ.

Neotominæ Merriam, Proc. Acad. Nat. Sci. Phila., pp. 228, Sept. 24, 1894.

Name, authority, and date.	Type or included species.
? *Bothriomys* Ameghino, 1889.....	*Bothriomys catenatus.*
Hodomys Merriam, 1894......	Neotoma alleni.
Nelsonia Merriam, 1897	(See page 277.)
Neotoma Say & Ord, 1825.....	Mus floridanus.
? *Paciculus* Cope, 1879...........	*Paciculus insolitus.*
Ptyssophorus Ameghino, 1889...	*Ptyssophorus elegans.*
Teonoma Gray, 1843..........	Neotoma drummondii (= Myoxus drummondii).
Tretomys Ameghino, 1889.......	*Tretomys atavus.*
Xenomys Merriam, 1892......	Xenomys nelsoni.

OTOMYINÆ.

Otomyinæ Thomas, Proc. Zool. Soc. London, 1896, p. 1017 (1897).

Name, authority, and date.	Type or included species.
? **Euryotis** Brants, 1827.........	Mus irroratus.
Oreinomys Trouessart, 1881...	New name for Oreomys Heuglin, 1877.
† **Oreomys** Heuglin, 1877........	Oreomys typus.
Otomys F. Cuvier, 1823........	Two species, afterwards named Otomys unisulcatus (Sept., 1829), and O. bisulcatus (Oct., 1829).

PHLŒOMYINÆ.

Phlœomyinæ Alston, Proc. Zool. Soc. London, 1876, p. 81.

Phlœomys Waterhouse, 1839..	Phlœomys cumingi.

RHYNCHOMYINÆ.

Rhynchomyinæ Thomas, Proc. Zool. Soc. London, 1896, p. 1017 (1897).

Rhynchomys Thomas, 1895...	Rhynchomys soricoides.

SIPHNEINÆ.

Siphneinæ Gill, Arrangement Fam. Mammals, Nov., 1872, p. 20.

Name, authority, and date.	Type or included species.
Myospalax Blyth, 1846	Georychus fuscocapillus.
Myotalpa Kerr, 1792	Mus talpinus, M. capensis, M. maritimus, M. aspalax, Myotalpa typhla.
Siphneus Brants, 1827	Mus aspalax.

OCHOTONIDAE.

‡ **Lagidæ** Schulze, Helios, XIV, p. 82, 1897.
‡ **Lagomina** Gray, Thomson's Ann. Philos., XXVI, p. 341, Nov., 1825.
‡ **Lagomyidæ** Lilljeborg, Syst. Öfvers. Gnag. Däggdjuren, pp. 9, 58, 1866.
Ochotonidæ Thomas, Proc. Zool. Soc. London, 1896, p. 1026 (1897).

Name, authority, and date.	Type or included species.
Abra Gray, 1863.	Lagomys curzoniæ.
* *Amphilagus* Pomel, 1854	*Amphilagus antiquus.*
* *Lagodus* Pomel, 1854	*Lagodus picoides.*
† **Lagomys** G. Cuvier, 1800	Le pika (Lepus alpinus).
Lagopsis Schlosser, 1884	*Lagomys oeningensis, L. verus.*
* *Marunsiomys*[1] Croizet, 1853	(?)
Myolagus Hensel, 1856.	*Lagomys sardus.*
Ochotona Link, 1795	Lepus pusillus, L. alpinus, L. ochotona.
* **Pika** Lacépède, 1799	Lepus alpinus.
* *Platyodon* Bravard, 1853	Nomen nudum.
* *Prolagus* Pomel, 1854	*Lagomys sansaniensis.*
Titanomys Meyer, 1843	*Titanomys visenoviensis.*

OCTODONTIDÆ.[2]

‡ **Aulacodina** Bonaparte, Conspectus Syst. Mastozoologiæ, 1850.
Capromyna Gervais, D'Orbigny's Dict. Univ. d'Hist. Nat., XI, p. 204, 1849.

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[1] Emended (?) to *Marcuinomys* (Croizet, 1859).

[2] Considerable diversity of opinion exists as to the subdivisions of the Octodonts. Some authors arrange the genera in 3, and others in 4 groups.

Capromyinæ: *Adelphomys*, Aulacodus, Capromys, *Discolomys*, *Eumysops*, *Graphimys*, Guillinomys, *Gyrignophus*, Isodon, *Lomomys*, Mastonotus, *Morenia*, Myocastor, Myopotamus, Mysateles, *Neoreomys*, *Olenopsis*, Ondatra, *Orthomys*, *Paranomys*, Plagiodontia, Potamys, *Pseudoneoreomys*, *Scleromys*, *Spaniomys*, *Stichomys*, Triaulacodus, *Tribodon* (?), and Thryonomys.

Ctenodactylinæ: Ctenodactylus, Massoutiera, Pectinator, *Pellegrina*, Petromus, and *Ruscinomys* (?).

Echimyinæ: Carterodon, Cercomys, Dactylomys, Echimys, Isothrix, Kannabateomys, Lasiomys, Lasiuromys, Loncheres, Lonchophorus, Mesomys, Nelomys Jourdan, Nelomys Lund, Phyllomys, Platythrix, Pœcilomys, Thrichomys, and Thrinacodus.

Octodontinæ: Abrocoma, Aconaemys, *Actenomys*, Ctenomys, Dendrobius, *Dicœlophorus*, *Dicolpomys*, Octodon, *Phtoramys*, *Pithanotomys*, *Platæomys*, Pœphagomys, Psammoryctes, Schizodon, and Spalacopus.

Capromysideæ Lesson, Nouv. Tabl. Règne Animal, Mamm., p. 124, 1842.

Capromyidæ Burmeister, Syst. Uebersicht Thiere Brasil., I, pp. 187, 189, 1854.

Ctenodactylina Gervais, Ann. Sci. Nat., 3me ser., XX, p. 245, 1853.

Ctenodactylinæ Gill, Arrangement Fam. Mamm., p. 22, Nov., 1872.

Ctenodactylidæ Zittel, Handb. der Palæont., IV, 2te Lief., p. 542, 1893.

Ctenomysideæ Lesson, Nouv Tabl. Règne Animal, Mamm., p. 105, 1842.

Echymyna Gray, Thomson's Ann. Philos., XXVI, p. 341, Nov., 1825.

Echymyidæ Bonaparte, Conspectus Syst. Mastozoologiæ, 1850.

Echinomyidæ Ameghino, Mam. Fos. Repub. Argentina, in Actas Acad. Nac. Ciencias, Cordoba, VI, p. 131, 1889.

Loncheridæ Burmeister, Syst. Uebers. Thiere Brasil., I, pp. 188, 192, 1854.

‡ **Muriformidæ** Ameghino, Enum. Sist. Especies Mam. Fós. Patagonia, p. 10, Dic., 1887.

Myiopotamina Bonaparte, Conspectus Syst. Mastozoologiæ, 1850.

Octodontidæ Waterhouse, Proc. Zool. Soc. London, 1839, p. 172.

‡ **Psammoryctina** Wagner, Wiegmann's Archiv f. Naturgesch., 1841, I.

‡ **Psammoryctidæ** Burmeister, Syst. Uebersicht Thiere Brasil., I, pp. 188, 212, 1854.

Spalacopodidæ Lilljeborg, Syst. Öfversigt Gnag. Däggdjuren, pp. 9, 44, 1866. (Spalacopodoïdes Brandt, 1855.)

Name, authority, and date.	Type or included species.
Abrocoma Waterhouse, 1837	Abrocoma bennettii, A. cuvieri.
Aconaemys Ameghino, 1891	New name for Schizodon Waterhouse.
Actenomys Burmeister, 1888	*Actenomys cuniculinus.*
Adelphomys Ameghino, 1887	*Adelphomys candidus.*
‡ **Aulacodus** Temminck, 1827	Aulacodus swinderianus. (See Thryonomys, Triaulacodus.)
Cannabateomys Lydekker, 1892.	Emended form for Kannabateomys.
Capromys Desmarest, 1822	Capromys fournieri.
Carterodon Waterhouse, 1848	Echimys sulcidens.
Cercomys Cuvier, 1829	Cercomys cunicularius.
Ctenodactylus Gray, 1830	Ctenodactylus massonii.
Ctenomys Blainville, 1826	Ctenomys brasiliensis.
Dactylomys I. Geoffroy, 1838	Dactylomys typus.
Dendrobius Meyen, 1833	Dendrobius degus.
Dicœlophorus Ameghino, 1888	*Dicœlophorus latidens, D. simplex, D celsus, Ctenomys priscus.*
Dicolpomys Winge, 1887	*Dicolpomys fossor.*
Discolomys Ameghino, 1889	*Discolomys cuneus.*
Echimys[1] Cuvier, 1809	Echimys cristatus, E. spinosus.
Eumysops Ameghino, 1888	*Eumysops plicatus, E. læviplicatus, E. robustus.*
Graphimys Ameghino, 1891	*Graphimys provectus.*
Guillinomys Lesson, 1842	Guillinomys chilensis.

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[1] Emended to Echinomys (Wagner, 1840), Enchomys (Gloger, 1841).

Gundi ('Fischer') Lataste, 1881	A common name for Ctenodactylus, erroneously credited to Fischer as a genus.
Gyrignophus Ameghino, 1891	*Gyrignophus complicatus.*
Habrocoma Wagner, 1842	Emended form for Abrocoma.
Houtia Agassiz, 1842	Nomen nudum. Native name for Capromys, included by Agassiz in list of genera, without reference or mention of species.
† **Isodon** Say, 1822	Isodon pilorides.
Isothrix Wagner, 1845	Isothrix bistriata, I. pachyura, I. pagurus.
Kannabateomys Jentink, 1891	Dactylomys amblyonyx.
Lasiomys Burmeister, 1854	Lasiomys hirsutus.
Lasiuromys Deville, 1852	Lasiuromys villosus.
Lomomys Ameghino, 1891	*Lomomys evexus.*
Loncheres[1] Illiger, 1811	Loncheres paleacea, Hystrix chrysuros.
Lonchophorus Lund, 1839	*Lonchophorus fossilis.*
Massoutiera Lataste, 1885	Ctenodactylus mzabi.
Mastonotus Wesmael, 1841	Mastonotus popelairi (=Mus coypus.)
Mesomys Wagner, 1845	Mesomys ecaudatus.
Morenia Ameghino, 1886	*Morenia elephantina.*
Myocastor Kerr, 1792	Mus (Myocastor) coypus (type), Mus (M.) zibethicus.
Myopotamus Geoffroy, 1805	Myopotamus bonariensis.
Mysateles Lesson, 1842	Mysateles poeppingii (= Capromys prehensilis).
Nelomys Jourdan, 1837	Echimys cristatus.
† **Nelomys** Lund, 1841	Echimys antricola, E. sulcidens. (See Thrichomys.)
Neoreomys Ameghino, 1887	*Neoreomys australis, N. indivisus, N. decisus.*
Octodon Bennett, 1832	Octodon cumingii.
Olenopsis Ameghino, 1889	*Olenopsis uncinus.*
* **Ondatra** Link, 1795	Mus coypus, Castor zibethicus.
Orthomys Ameghino, 1881	*Orthomys dentatus.*
Orycteromys('Blainville') Agassiz, 1842.	Used by Blainville in 1826, only in the French form Oryctérome, for the genus described as Ctenomys. (See Orycteromys, p. 256.)
Paranomys (Scalabrini MS.) Ameghino, 1889	*Paranomys typicus.*
Pectinator Blyth, 1856	Pectinator spekei.
Pellegrina Gregorio, 1886	*Pellegrina panormensis.*
Petromus A. Smith, 1831	Petromus typicus.
Phtoramys Ameghino, 1887	*Phtoramys homogenidens.*

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[1] Emended to Loncherites (London Encyclopœdia, 1845).

Phyllomys Lund, 1839	Phyllomys brasiliensis (?)
Pithanotomys Ameghino, 1887	*Pithanotomys columnaris.*
Plagiodontia[1] F. Cuvier, 1836.	Plagiodontia aedium.
* *Plataeomys* Ameghino, 1881	*Plataeomys scindens.*
* **Platythrix** Pictet, 1842	(?)
* **Pœcilomys** Pictet, 1842	(?)
Pœphagomys F. Cuvier, 1834	Pœphagomys ater.
Potamys Larranhaga, 1823.	Le quyia of Azara (Myopotamus coypus).
Psammoryctes Pœppig, 1835	Psammoryctes noctivagus (= Spalacopus pœppigii).
Pseudoneoreomys Ameghino, 1891	*Pseudoneoreomys pachyrhynchus, P. leptorhynchus, P. mesorhynchus.*
? *Ruscinomys* Depéret, 1890	*Ruscinomys europæus.*
† **Schizodon** Waterhouse, 1842	Schizodon fuscus. (See Aconaemys.)
Scleromys Ameghino, 1887	*Scleromys angustus.*
Spalacopus Wagler, 1832	Spalacopus pœppigii.
Spaniomys Ameghino, 1887	*Spaniomys riparius, S. modestus.*
Stichomys Ameghino, 1887	*Stichomys regularis, S. constans.*
Thrichomys Trouessart, 1881	Thrichomys antricola, T. inermis, T. brevicauda.
Thrinacodus Günther, 1879	Thrinacodus albicauda.
Thryonomys Fitzinger, 1867	Aulacodus semipalmatus.
Triaulacodus Lydekker, 1896	New name for Aulacodus Temminck, 1827. (See Thryonomys.)
Tribodon Ameghino, 1887	*Tribodon clemens.*

PEDETIDÆ.

‡ **Halamydæ** Gray, London Medical Repository, XV, p. 303, April 1, 1821.
Pedestina Gray, Thomson's Ann. Philos., XXVI, p. 342, Nov., 1825.
Pedetidæ Gill, Arrangement Fam. Mamm., p. 20, Nov., 1872.

Name, authority, and date.	Type or included species.
Helamys F. Cuvier, 1817	Mus cafer.
Lagotis Blainville, 1817	'La grande gerboise du Cap.'
Pedetes Illiger, 1811	Dipus cafer.

PSEUDOSCIURIDÆ.

Pseudosciuridæ Zittel, Handb. der Palæont., IV, 2te Lief., p. 523, 1893.

Name, authority, and date.	Type or included species.
Adelomys Gervais, 1853	*Theridomys vaillanti.* (See *Theridomyidæ.*)
? *Decticadapis* Lemoine, 1883	*Decticadapis sciuroides.*
Pseudosciurus Hensel, 1856	*Pseudosciurus suevicus.*
Sciurodon Schlosser, 1884	*Sciurodon cadurcense.*
Sciuroides Forsyth Major, 1873	*Sciurus rutimeyeri, Sciuroides fraasi, S. siderolithicus, S. minimus.*

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[1] Emended to Plagiodon (Alston, 1876).

SCIURIDÆ.

Allomyidæ Marsh, Am. Journ. Sci., 3d ser., XIV, p. 253, Sept., 1877.
Arctomydæ Gray, London Med. Repository, XV, p. 303, April 1, 1821.
Arctomysideæ Lesson, Nouv. Tabl. Règne Animal, Mamm., p.115, 1842.
‡ **Campsiurina** Brandt, fide Carus, Handb. Zool., p. 96, 1868–'75.
Leithiidæ Lydekker, Proc. Zool. Soc. London, 1895, p. 862 (1896).
Nannosciurinæ Forsyth Major, Proc. Zool. Soc. London, 1893, pp. 187, 189.
Pteromidæ Anderson, Yunnan Exped., p. 278, 1879.
Sciuridæ Gray, London Medical Repository, XV, p. 304, April 1, 1821.

Name, authority, and date.	Type or included species.
Allomys Marsh, 1877	*Allomys nitens.*
Ammospermophilus Merriam, 1892.	Tamias leucurus.
Amphisciurus (Bravard MS.) Lydekker, 1885	*Amphisciurus typus.*
Anisonyx Rafinesque, 1817	Anisonyx brachiura (= Arctomys columbianus).
Arctomys Schreber, 1780	Arctomys marmota, A. monax, A. bobac, A. empetra, A. citillus.
Atlantoxerus Forsyth Major, 1893.	Xerus getulus.
Baginia Gray, 1867	Sciurus platani.
Callosciurus Gray, 1867	Sciurus rafflesii.
Callospermophilus Merriam, 1897.	Sciurus lateralis.
Citillus Lichtenstein, 1827–'34.	Citillus mexicanus, C. leptodactylus, C. mugosaricus.
Colobotis Brandt, 1844	Spermophilus fulvus.
Cynomys Rafinesque, 1817	Cynomys socialis, C. grisea.
Echinosciurus Trouessart, 1880.	Sciurus hypopyrrhus (type), S. variabilis, S. stramineus.
Eosciurus Trouessart, 1880	Sciurus bicolor (type), S. giganteus, S. indicus, S. maximus, S. macrurus.
Eoxerus Forsyth Major, 1893	Xerus laticaudatus, X. berdmorei, X. tristriatus, X. palmarum, X. insignis, X. hosei.
Erythrosciurus Gray, 1867	Sciurus ferrugineus, S. siamensis.
Eupetaurus Thomas, 1888	Eupetaurus cinereus.
Eutamias Trouessart, 1880	Tamias asiaticus (type), T. harrisi, T. lateralis, *T. laevidens.*
Farunculus ('Lesson') Gray, 1867.	Probably a misprint for Funambulus.
Funambulus Lesson, 1832	Funambulus indicus.
Funisciurus Trouessart, 1880	Sciurus lemniscatus.
Geosciurus A. Smith, 1834	Sciurus erythopus.
Guerlinguetus Gray, 1821	Sciurus guerlinguetus.
Heliosciurus Trouessart, 1880.	Sciurus annulatus.
Heterosciurus Trouessart, 1880.	Sciurus ferrugineus.

Ictidomys J. A. Allen, 1877...	Spermophilus tereticaudus, S. mexicanus, S. 13-lineatus (type), S. franklini.
Lagomys Storr, 1780..........	"An unnatural and undefined combination of forms with squat bodies [including 24 species], but typified by species of Arctomys."—Gill.
† **Laria** Gray, 1867...	Sciurus insignis.
Leithia[1] Lydekker, 1896........	*Myoxus melitensis.*
Lipura Illiger, 1811............	Hyrax hudsonius.
Macroxus Cuvier, 1823........	Le guerlinguet et le toupaye.
* **Marmota** Blumenbach, 1779...	Marmota alpina, M. cricetus, M. lemmus, M. typhlus, M. capensis.[2]
Meniscomys Cope, 1878..........	*Meniscomys hippodus, M. multiplicatus.*
Microsciurus J. A. Allen, 1895.	Sciurus (Microsciurus) alfari.
Monax Warden, 1819.........	Monax missouriensis (= Cynomys ludovicianus).
Nannosciurus Trouessart, 1880.	Sciurus melanotis, S. exilis.
Neosciurus Trouessart, 1880...	Sciurus carolinensis (type), S. arizonensis, S. griseoflavus, S. aberti, S. fossor.
Otocolobus Brandt, 1844......	Synonym of Colobotis (?).
Otospermophilus Brandt, 1844.	Spermophilus beecheyi.
Palæosciurus Pomel, 1854.......	*Sciurus* (*Palæosciurus*) *feignouxii*, *S.* (*P.*) *chalaniati.*
Palmista Gray, 1867...........	Sciurus palmarum, S. penicillatus, S. layardii, S. sublineatus.
Parasciurus Trouessart, 1880...	Sciurus niger.
Paraxerus Forsyth Major, 1893.	Xerus cepapi, X. palliatus, X. pyrropus, X. congicus, X. lemniscatus, X. isabella, X. boehmi.
Petaurista Link, 1795.........	Sciurus volucella, S. volans, S. hudsonius, S. petaurista (type), S. sagitta.
Plesiarctomys Bravard, 1848-'52.	*Plesiarctomys gervaisii.*
Plesispermophilus Filhol, 1883...	*Plesispermophilus angustidens.*
Protoxerus Forsyth Major, 1893.	Sciurus stangeri, S. ebii, S. aubinnii.
Pteromys G. Cuvier, 1800.....	Sciurus volans, S. petaurista.
Pterotix Rafinesque, 1815.. ..	Nomen nudum.
Ratufa Gray, 1867............	Sciurus indicus.
Rheithrosciurus[3] Gray, 1867..	Sciurus macrotis.
Rhinosciurus Gray, 1843	Rhinosciurus tupaioides.

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[1] This genus is only provisionally referred to the Sciuridæ. Lydekker has recently suggested a special family, *Leithiidæ*, for it.

[2] From the 7th edition of the Handbuch d. Naturgeschichte, 1803. The first edition, 1779, not seen.

[3] Emended to Rhithrosciurus (Lydekker, 1891).

Rukaia Gray, 1867	Sciurus macrourus, S. bicolor, S. ephippium.
Sciuropterus F. Cuvier, 1825	Sciurus volans.
Sciurus Linnæus, 1758	Sciurus vulgaris, S. niger, S. cinereus, S. flavus, S. getulus, S. striatus, S. volans.
Spermophilopsis Blasius, 1884	Spermophilus leptodactylus.
Spermophilus F. Cuvier, 1825	Mus citillus.
Spermosciurus Lesson, 1836	Includes 12 species, mostly from Africa.
Stereodectes Cope, 1869	*Stereodectes tortus.*
Tamias Illiger, 1811	Sciurus striatus.
Tamiasciurus Trouessart, 1880	Sciurus hudsonicus.
Tenotis Rafinesque, 1817	Tenotis griseus (= Sciurus erithopus).
Xerospermophilus Merriam, 1892	Spermophilus mohavensis.
* **Xerus** Hemprich & Ehrenberg, 1832	Xerus brachyotus (and X. syriacus?).

SPALACIDÆ.[1]

‡ **Aspalacidæ** Gray, Thomson's Ann. Philos., XXVI, p. 342, Nov., 1825.
Aspalomyina Waterhouse, Ann. & Mag. Nat. Hist., X, p. 203, 1842.
Rhizomyinæ Thomas, Proc. Zool. Soc. London, 1896, p. 1021 (1897).
Spalacidæ Gray, London Med. Repository, XV, p. 303, April 1, 1821.

Name, authority, and date.	Type or included species.
Aspalax Desmarest, 1804	Mus typhlus.
* **Aspalomys** Laxmann	(?)
Chrysomys Gray, 1843	Bathyergus splendens.
Nyctocleptes Temminck, 1832	Nyctocleptes dekan (= Mus sumatrensis).
Ommatostergus Nordmann, 1840	Ommatostergus pallasii.
Rhizomys Gray, 1831	Rhizomys sinensis, R. sumatrensis.
Spalax Güldenstädt, 1770	Spalax microphthalmus (=S. typhlus Pall., 1778).
Tachyoryctes Rüppell, 1835	Bathyergus splendens.
* **Talpoides** Lacépède, 1799	Mus typhlus.
Typhlodon Falconer, 1868	Nomen nudum (*Rhizomys sivalensis* Lydekker, 1878?)

THERIDOMYIDÆ.

Theridomyidæ Alston, Proc. Zool. Soc. London, 1876, pp. 70, 88.
Trechomyinæ Trouessart, Cat. Mamm. tam viv. quam foss, p. 392, 1897.

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[1] Chrysomys, Nyctocleptes, Rhizomys, Tachyoryctes and *Typhlodon* belong to the Rhizomyinæ; Aspalax, Aspalomys, Ommatostergus, Talpoides, and Spalax to the Spalacinæ.

Name, authority, and date.	Type or included species.
Adelomys Gervais, 1853	*Theridomys vaillanti.* (See *Pseudosciuridæ.*)
Archæomys Laizer & Parieu, 1839.	New name for *Palæomys* Laiz. & Par.
Blainvillimys (Bravard MS.) Gervais, 1848–'52	*Theridomys blainvillei.*
Cournomys (Croizet) Zittel, 1893.	Synonym of *Issidioromys.*
Cuvierimys Bravard, 1848–'52	*Cuvierimys laurillardi.*
Dipoides Jäger, 1835	Species not named.
Gergoviomys (Croizet MS.) Blainville, 1840	Species not named.
* *Isoptychus* Pomel, 1854	*Theridomys* (*Isoptychus*) *jourdani*, *Isoptychus auberyi*, *I. antiquus*, *I. cuvieri*, *I. vassoni*, *Theridomys aquatilis* (*?*).
Issidioromys (Croizet MS.) Blainville, 1840	*Issidioromys pseudanæma* Gervais, 1848.
† *Neomys* Bravard, 1844	*Neomys lembronicus* (= *Theridomys lembronicus*).
Nesokerodon Schlosser, 1884	*Isiodoromys minor.*
* *Omegodus* Pomel, 1854	*Omegodus echimyoïdes.*
* *Palanæma* Pomel, 1854	*Palanæma antiquus.*
† *Palæomys* Laizer & Parieu, 1839.	*Palæomys arvernensis.* (See *Archæomys.*)
* *Perrieromys* Croizet	(?)
Protechimys Schlosser, 1884	*Protechimys gracilis*, *P. major.*
*† *Tæniodus* Pomel, 1854	*Echimys curvistriatus.*
Theridomys Jourdan, 1837	Species not named in first description.
Trechomys Lartet, 1869	*Trechomys bonduellii.*

INCERTÆ SEDIS.

Anotis Rafinesque, 1815	Nomen nudum.
Archilagus Hæckel, 1895	Hypothetical genus—'Atavus omnium Rodentium.'
Asteromys[1] Ameghino, 1897	*Asteromys punctus*, *A. prospicuus.*
Budomys ('Croizet') Bravard, 1843	Nomen nudum.
Cephalomys[1] Ameghino, 1897	*Cephalomys arcidens*, *C. plexus.*
Haplostropha Ameghino, 1891	*Haplostropha scalabriniana.*
Hystriocomys Giebel, 1860	*Hystriocomys thuringiacus.*
? *Mixodectes*[2] Cope, 1883	*Mixodectes pungens*, *M. crassiculus.*
Orchiomys[1] Ameghino, 1897	*Orchiomys prostans.*

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[1] *Cephalomyidæ* Ameghino, Bol. Inst. Geog. Argentino, XVIII, p. 592, Oct. 6, 1897.

[2] *Mixodectidæ* Cope, Proc. Acad. Nat. Sci. Phila., p. 80, May 22, 1883.

"The discovery of some skeleton fragments in good association with a lower jaw of *Mixodectus pungens* makes it probable that this genus should be removed from the Primates and placed as an extremely primitive Rodent."—Matthew, Bull. Am. Mus. Nat. Hist. New York, IX, p. 265, 1897.

Palaiotrogus Jäger, 1839	*Palaiotrogus steinheimensis.*
Paradoxomys[1] Ameghino, 1885	*Paradoxomys cancrivorus.*
Protechynus Filhol, 1891	Nomen nudum.
Protoptychus[2] Scott, 1895	*Protoptychus hatcheri.*

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[1] *Paradoxomyina* Ameghino, Bol. Acad. Nac. Cien., Córdoba, IX, p. 79, 1886. *Paradoxomydæ* Ameghino, Mam. Fos. Repub. Argentina, in Actas Acad. Nac. Ciencias, Córdoba, VI, p. 122, 1889.

[2] "The genus is probably to be regarded as the ancestral type of the Dipodidæ, and indicates an American origin for this family."—Scott, Proc. Acad. Nat. Sci. Phila., 1895, p. 286.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

CERVUS ROOSEVELTI, A NEW ELK FROM THE OLYMPICS.

BY C. HART MERRIAM.

For many years naturalists have known of the presence of Elk in the Olympic Mountains and other ranges along the Pacific coast, but until recently no specimen, so far as I am aware, has found its way to any museum. When in the Olympic Mountains last August I arranged with two trappers who had established a winter camp in the deep canyon of Hoh River, at the north foot of Mt. Olympus, to secure specimens as soon as the animals had put on the winter coat. The first of these—a fine old bull with massive antlers—has now arrived and is safely installed in our National Museum.

Dr. J. G. Cooper, in his report on the Mammals of the 47th and 49th Parallels, published in 1860, states that the Elk was abundant in the dense forests of the Coast Range, and adds: "An intelligent farmer, who formerly hunted Elk in New York State, told me that he considered these a different animal, being much larger and having larger and differently formed horns."* In the same volume Geo. Gibbs states that "Judge Ford, long a settler in Washington Territory and an enthusiastic hunter, says that the Elk of the Pacific coast is not the Elk of the 'plains,' but has a *larger and coarser head*. He has been through life familiar with game and is *positive* that they are different animals."† John Keast Lord, in his '*Naturalist in Vancouver Island and British Columbia*,' published in London in 1866, says: "The Wapiti on the Oregon coast grows much larger, and differs in color from the animal found on the inland mountains." Dr. James C. Merrill, Major and Surgeon U. S. Army, informs me that he also has seen numerous heads and antlers of the Olympic Elk, all of which were distinguishable at a glance from the common species.

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* Pacific Railroad Reports, Vol. XII, Pt. II, p. 88, 1860.

† *Ibid.*, p. 133.

In the Oregon exhibit of the World's Columbian Exposition at Chicago, in 1893, were several mounted heads of this Elk. They were examined by Hon. Theodore Roosevelt, who told me that they differed from those of the Rocky Mountain animal in being black and in having antlers with relatively straight beams and an irregular cluster of points at the tip instead of the usual incurved terminal prong.

Mr. Roosevelt, in his entertaining '*Wilderness Hunter*,' describes the Rocky Mountain Elk or Wapiti as " not only the most stately and beautiful of American game, but also the noblest of the stag kind throughout the world ; " and adds : " Whoever kills him has killed the chief of his race, for he stands far above his brethren of Asia and Europe." These remarks must now be transferred from the common Wapiti to the Pacific coast animal.

Last summer, when engaged in field-work in the Puget Sound region, I saw several heads and a few hides of this Elk, and was surprised that such a superb species had remained so long undescribed. I deem it a privilege to name this splendid animal Roosevelt's Wapiti. It is fitting that the noblest deer of America should perpetuate the name of one who, in the midst of a busy public career, has found time to study our larger mammals in their native haunts and has written the best accounts we have ever had of their habits and chase.

Cervus roosevelti sp. nov. Roosevelt's Wapiti.

Type from Mt. Elaine (on ridge between heads of Hoh, Elwah, and Soleduc rivers) near Mt. Olympus, Olympic Mts., State of Washington.

Type No. 91579, ♂ ad., U. S. Nat. Mus., Biological Survey Coll. Collected Oct. 4, 1897 by Hans and Chris Emmet.

General characters.—Size large ; head and legs black (probably only in winter pelage) ; skull and antlers massive ; beams of antlers relatively short and straight, with terminal prong aborted.

Description of type specimen (which has nearly completed the molt from fall to winter pelage).—Face from between eyes to nose-pad, sooty blackish, somewhat grizzled on cheeks with golden-brown ; eyelids black, surrounded by area of pale fulvous, incomplete anteriorly ; rest of head and neck brown, becoming black along median line and mixed black and reddish on top of head ; back and sides a peculiar grayish brown with incomplete dusky stripe along median dorsal line ; breast and belly dull reddish chestnut ; legs and feet sooty black with space between hoof and dew claws fulvous, the fulvous reaching up a short distance along median line posteriorly; fore legs abruptly black from body to hoof, with a narrow fulvous patch on inner side of forearm; hind legs and feet sooty black, the black on inner side of thigh reaching up nearly to groin, and on posterior aspect reaching nearly to rump in a band 40–50 mm. wide which curves slightly outward on each side of lower part of rump patch; rump patch pale dull buffy-fulvous, deepening between thighs to pale tan; throat grizzled black and dark golden-brown, becoming darker anteriorly, with a narrow median beard (about 30 mm. broad) of pale fulvous, beginning opposite the angle of the mouth and sharply defined anteriorly and laterally by a blackish border, spreading and fading posteriorly; chin and lower lip blackish with a sharply defined wedge-shaped mark of buffy fulvous on each side of median line, its base at anterior edge of lip, its apex directed posteriorly. Metatarsal gland (situate 160 mm. below heel on outer side) a conspicuous oval patch of reddish fulvous about 80 mm. in length, enclosing a white central stripe 35 mm. in length, and surrounded by the black of the leg and foot.

Cranial characters.—The skull of *Cervus roosevelti*, compared with that of *C. canadensis* from the Rocky Mountains, is much larger, broader and more massive. The frontals are not only conspicuously broader but are *very much flatter*, giving the cranium a different profile. The muzzle also is much broader. The cavities in front of the orbits, on the other hand, are decidedly smaller.

Measurements of type specimen.—Total length, measured in flesh, 2490 mm. (= 8 ft. 2 in.); tail in dry skin about 80 mm.; ears in dry skin: from base posteriorly 225 mm., from base of opening 208 mm.

Antlers: Spread 990 mm. (= 3 ft. 3 in.); length of left beam from burr to tip 1050 (= 41¼ in.); circumference just above burr 285 mm. (= 11¼ in.); least circumference above bez-tine 190 mm. (= 7½ in.).

Antlers.—The antlers are large, heavy and relatively short, with the terminal prongs aborted, so that the total length from burr to tip is about 500 mm. (nearly 20 inches) less than in well formed antlers of the Rocky Mountain Elk. The brow, bez, trez, and 4th tine are similar to those of the ordinary Wapiti, but above the 4th the antler is flattened and sub-palmate and ends in 2 or 3 short points the tips of which reach only slightly above the tip of the 4th prong.

Whether the aborted condition of the terminal part of the antler in Roosevelt's Wapiti is the result of long residence in the dense Pacific coast forests, where longer antlers would be inconvenient, or is indicative of closer relationship with the stags of Europe and Asia, which normally carry somewhat similar antlers, is an interesting question.

Among some black heads in a taxidermist shop in Victoria I saw one, said to have been killed on Vancouver Island, in which the terminal prong of the antlers is much longer than usual, approaching the normal condition of the Rocky Mountain animal. But it by no means follows that the antlers in question belong to the head on which they were mounted, for many taxidermists have a reprehensible habit of grafting handsome antlers on handsome heads irrespective of zoological or geographical obstacles. During the past three months I have seen more than a dozen mounted heads of Elk, Deer, and Antelope bearing horns which the taxidermists admitted were selected from stock in hand, without reference to the heads on which they grew.

Other specimens.—In the taxidermist shop of L. F. Richolt & Co., at Centralia, Washington, I examined a very beautiful hide of a Wapiti killed in winter in Chehalis County. The color of the back and sides was a beautiful clear bluish gray, with a tint suggesting lavender, and the legs where they had been cut off were abruptly black. The amount of black on the head varies considerably in different specimens. Probably part of this variation is due to age and part to season. All of the adult winter heads were black from nose to ears, with more or less black on the neck. Some had the entire neck black, the black reaching back to the breast and nearly to the shoulders. The development of the mane seems to be much as in the Rocky Mountain Wapiti.

Geographic distribution.—Roosevelt's Wapiti inhabits the dense coniferous forests of the humid Pacific coast strip from near the northern end of Vancouver Island southward through the coast ranges of Washington and Oregon to northwestern California. In 1860, according to George Gibbs, it followed the coast "all the way down to San Francisco" (Pacific Railroad Reports, vol. XII, Pt. II, p. 133). This is a very natural distribution, corresponding with that of many other species. Through the agency of man the southern part of the range has now been cut off, but just how far I am unable to say. Mr. Charles H. Townsend, in his important '*Field Notes on the Mammals, Birds, and Reptiles of Northern California*,' published in 1887, says that the Wapiti "still exists in moderate numbers in Mendocino, Humboldt, and Trinity counties, along the upper courses of the Eel, Elk, and Trinity rivers. Two large Elk were shot in Humboldt County in December, 1885, and brought to Eureka, where I saw them."*

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*Proc. U. S. National Museum, X, pp. 168–169, 1887.

But the southern limit of its range is of far less consequence than the eastern limit, for the important question is, Do or do not the ranges of the Rocky Mt. and Pacific coast Wapiti come together? Apparently they do not. Some of the old reports state that the Pacific Elk formerly inhabited the Cascade range in Washington and Oregon. But even in this case the Cascades are separated, except at the north, by the full breadth of the Great Basin and Plains of the Columbia. North of the Columbia River the forest region of the northern Cascades is practically connected with that of the Rocky Mts. by means of the timber-covered parts of southern British Columbia and the Colville Indian reservation of northern Washington. But this region, so far as I can learn, is not, and never has been, inhabited by Elk. Mr. John Fannin, Curator of the Provincial Museum at Victoria, tells me that while Elk are common on Vancouver Island they do not occur anywhere in British Columbia except along its eastern border in the Rocky Mt. region.

At the time of my visit to the Olympics the latter part of August the Elk had been recently driven out of the upper Hoh and Soleduc canyons by Indians, and the numerous tracks seen were 10 days or 2 weeks old. Well-beaten trails followed the crests of the higher ridges and traversed the principal valleys. Many of these trails, with little labor, can be made available for horses and afford almost the only means of penetrating the region.

Mr. W. A. Perry has published the following account of the way Indians kill Elk in these mountains. He says: "The principal Indian method of hunting the Elk, in the Olympic Range, is by driving them over precipices. Selecting a well-known spot, on a well-traveled Elk-trail, they will lie in wait for weeks, until a band appears coming down the mountain. The place usually selected is one where the trail curves around some great rock, just at the edge of a precipice a hundred feet or more in height. A scout, stationed high up the mountain, gives notice of the approach of a band, and then the Indians mass at the lower end of the curve, while others conceal themselves above the curve. As soon as the band passes the latter, they spring to their feet, rush down the trail, yelling and firing guns. The Indians at the lower end of the curve do the same, and the Elk, finding themselves surrounded, leap over the cliff and are crushed on the rocks below."*

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*The Big Game of North America. Edited by G. O. Shields. p. 53, 1890.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

NELSONIA NEOTOMODON, A NEW GENUS AND SPECIES OF MURINE RODENT FROM MEXICO.

BY C. HART MERRIAM.

The collection of mammals made in Mexico by Mr. E. W. Nelson still contains many novelties. Recently, in looking at the skull of a large White-footed Mouse from the mountains of Zacatecas, supposed to be a typical *Peromyscus*, I was startled to find that it had the flat-topped prismatic teeth of a Wood Rat, *Neotoma*. Closer examination of the dentition showed that while the 1st and 2d upper and 1st lower molars agree essentially with those of *Neotoma*, the 3d upper and 2d and 3d lower differ so materially that it is necessary to erect a new genus for the animal's reception. The skull also is peculiar and unlike either *Neotoma* or *Peromyscus*. The most important difference is in the antorbital slit, which does not notch the upper surface of the maxillary root of the zygoma. Another character is the production of the inferior angle of the antorbital slit to form a distinct process. The tail is large and blunt, much as in *Neotoma*—not tapering to a slender point as in *Peromyscus*.

The new genus may be defined as follows:

Nelsonia gen. nov.

Type.—Nelsonia neotomodon sp. nov., from Plateado, Zacatecas, Mexico.

Diagnosis.—Cranial characters: Skull in general resembling that of a large *Peromyscus* but flatter; zygomata heavier, less depressed, and more spreading anteriorly; antorbital slits relatively narrow and only faintly notching upper surface of maxillary root of zygoma; inferior angle of antorbital slit thickened and protruding forward and outward as a distinct process; audital bullæ sub-conical as in *Peromyscus* and *Hodomys*, not bullate as in *Neotoma* and *Xenomys;* brain case depressed as in *Peromyscus*, not elevated as in *Neotoma*, *Xenomys*, and *Hodomys;* incisive foramina large and open, broader anteriorly than in *Neotoma* or *Peromyscus;* coronoid process of mandible small, hardly larger than in *Peromyscus.*

Dental characters (Fig. 14).—Teeth rooted, large, massive, and prismatic, with flat crowns presenting deep reëntrant angles of enamel (enamel of equal thickness throughout) as in *Neotoma* and *Xenomys*—totally different from the small tubercular teeth (with enamel of unequal thickness) of *Peromyscus.* Crowns of 1st and 2d upper and 1st lower molars with enamel pattern essentially as in *Neotoma*, *Hodomys*, and *Xenomys.* Crowns of 3d upper and 2d and 3d lower molars with enamel pattern unlike that of any known genus; 3d upper molar with a single very deep and narrow reëntrant angle on outer side, which pushes almost completely across the tooth, dividing the crown into two subtriangular lobes, the posterior of which is the larger; 2d lower molar with one reëntrant angle on each side, the inner deeper than, and passing anterior to, the outer, dividing the crown into two transverse loops the posterior of which is sometimes deeply notched on the inner side by a secondary reëntrant angle; 3d lower molar with a single and rather open reëntrant angle on inner side, reaching only half way across tooth, and a slight projection (without distinct reëntrant angle) on outer side.

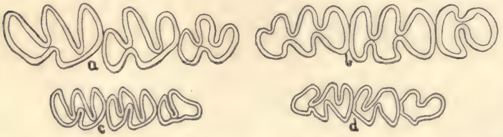

FIG. 14.—*Molar teeth of Nelsonia neotomodon and Neotoma desertorum.* × 3.

a (upper) *b* (lower) molars of *Neotoma desertorum.*
c (upper) *d* (lower) molars of *Nelsonia neotomodon.*

External characters.—Size (of only known species) equalling largest species of *Peromyscus;* tail large and blunt as in *Neotoma*, and well haired, with terminal pencil larger than usual in *Peromyscus;* feet large, relatively as in *Neotoma*—decidedly larger than in *Peromyscus.*

Nelsonia neotomodon sp. nov.

Type from mountains near Plateado, Zacatecas, Mexico. (Altitude about 2500 meters or 8200 feet.) No. 90891, ♂ ad. U. S. Nat. Mus., Biological Survey Coll. Collected Sept. 3, 1897, by E. W. Nelson and E. A. Goldman. Original No. 11625.

General characters.—Size, coloration, and general appearance similar to the larger species of *Peromyscus* (as *P. californicus*), but whiskers larger and coarser, tail larger and blunter, and feet larger; ears large and nearly naked; tail well haired, white-tipped, and with a distinct terminal pencil.

Color.—Upper parts grayish brown, conspicuously lined with black on rump and posterior half of back, and suffused along the sides with pale dull fulvous, which becomes intensified inferiorly so as to form a fairly distinct band between the gray of the back and white of the belly, reaching all the way from cheeks to thighs; under parts white, the hairs plumbeous at base; fore and hind feet white; outer side of hind legs dusky to ankles; eyes surrounded by a narrow ring of black; white of upper lip reaching up on sides of nose half way to eye; tail sharply bicolor; dusky above, white below, and at tip all round.

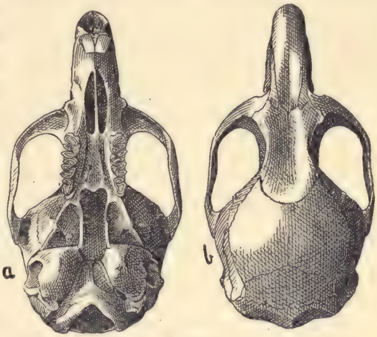

FIG. 15.—Skull of *Nelsonia neotomodon*. × 1½.

Cranial and dental characters.—The cranial and dental characters have been so fully given in the generic diagnosis and are so well shown in the accompanying drawings that it will be unnecessary to describe them further unless a second species is discovered.

Measurements. — Type specimen, ♂ ad.: total length, 247; tail vertebræ, 121; hind foot, 29. Average of 6 specimens from type locality: total length, 244; tail vertebræ, 121; hind foot, 29.

Geographic distribution. — Specimens of this remarkable animal were collected by Mr. Nelson in the higher parts of the Sierra Madre in the western corner of the State of Zacatecas, and about 100 miles farther south in the same range, near Bolaños, Jalisco. Another series was obtained in a detached range, east of the Sierra Madre, near Plateado, Zacatecas. Mr. Nelson informs me that the animals were usually found about ledges or other rocky places in the pine forest, at an altitude of 8,000 feet or upwards. Near Plateado specimens were secured along the upper edge of the oak belt, where the oaks mix with the lower edge of the pines. None were found at lower altitudes.

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PROCEEDINGS

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BIOLOGICAL SOCIETY OF WASHINGTON

A NEW RACE OF PINE SQUIRREL FROM THE COAST REGION OF NORTHERN CALIFORNIA.

BY OUTRAM BANGS.

Mr. C. A. Allen, of Nicasio, California, has sent me fourteen pine squirrels that were shot at Philo, Mendocino County, California, by a friend of his, who sent them to him in the meat, Mr. Allen measuring, sexing, and skinning them. This series shows the pine squirrel of the coast region of northern California, west of the mountains, to be a well-marked race. The region north of its range is occupied by *S. hudsonicus douglasi*, and in the mountains to the east is found *S. hudsonicus californicus*. The present form differs considerably from either of these squirrels, though undoubtedly it intergrades with one or both of them.

The pine squirrel of the coast region of northern California may be known as follows:

Sciurus hudsonicus orarius subsp. nov.

Type from Philo, Mendocino County, California, ♀ old adult, No. 4978. Coll. E. A. and O. Bangs. Collected Dec. 9, 1895. Skinned, sexed, and measured by C. A. Allen.

General characters.—Size and proportions of *S. hudsonicus douglasi;* ear small and low as in that form; colors above very dark with but little rusty; colors below varying from ochraceous to ochraceous-buff; tail dark colored with but little rusty in it and conspicuously bordered by a deep fringe of white.

Color.—Effect of upper parts, owing to the banding of the hairs, deep olive varied with a fine sprinkling of yellowish olive, a little rust color intermixed at base of tail, extending in some specimens onto rump; more olive gray on cheeks and top of nose; feet, hands, and underparts varying from pale ochraceous-buff to (in a few specimens) ochraceous; a broad black band separating colors of upper and under parts, usually present (in one or two specimens nearly obsolete); orbital ring pale ochraceous-buff; tail: hairs of upper surface tawny at base, then black and white tipped; of lower surface dull tawny olive at base, then black and white tipped; whiskers, black.

Measurements.

No.	Sex.	Date.	Total length.	Tail vertebræ.	Hind foot.	Ear.
4978 type......	♀ old ad.	Dec. 9, 1895	320.	134.8	50.8	22.4
4987 topotype..	♀ ad....	Dec. 9, 1895	302.2	131.	50.8	22.4
4979 " ..	♀ old ad.	Dec. 9, 1895	323.8	136.4	50.8	22.4
4984 " ..	♀ ad.....	Dec. 9, 1895	317.6	133.6	50.8	22.4
4980 " ..	♀ ad.....	Dec. 9, 1895	317.6	133.6	50.8	22.4
4989 " ..	♂ old ad.	Dec. 9, 1895	327.2	139.8	50.8	22.4
4983 " ..	♀ ad.....	Dec. 9, 1895	316.	134.8	50.8	22.4
4982 " ..	♀ ad.....	Dec. 9, 1895	319.4	147.6	50.8	22.4
4986 " ..	♀ ad...	Dec. 9, 1895	319.4	131.	50.8	22.4
4985 " ..	♂ yg.....	Dec. 9, 1895	306.4	141.6	50.8	22.4
4981 " ..	♂ ad.....	Dec. 9, 1895	327.2	139.8	50.8	22.4
5462 " ..	♀ old ad.	Dec. 16, 1895	320.4	131.	50.8	20.6
4832 " ..	♂ ad.....	July 24, 1895	317.6	127.	50.8	.....
4988 " ..	♀ yg.....	Dec. 9, 1895	314.2	136.4	50.8	20.6

Remarks.—Compared with *S. h. douglasi*, *S. h. orarius* has the same small ear, but differs very much in color, the dark olive shades of the upper parts of *orarius*, with but little rusty anywhere, being in marked contrast to the ferruginous dorsal region of *douglasi*. The white fringed tail of *orarius*, with a broad black subapical band, can always be told from the rusty yellow fringed tail of *douglasi*. The under parts are, as a rule, much paler, more ochraceous-buff, less ochraceous-rufous than in *douglasi*.

With *S. hudsonicus californicus*, *S. hudsonicus orarius* scarcely needs comparison, the large ear, white or creamy white under parts, and bright ochraceous-rufous dorsal stripe of *californicus* at once distinguishing it.

Most of my specimens were taken on December 9, one only being taken in midsummer. The specimens taken December 9 show all the stages from probably the summer to full winter coat, it appearing to be the time at which that change takes place. There seems to be but a slight difference in color between the winter and summer pelages, though the black side stripes probably nearly disappear when the full winter coat has been acquired, and the ears are more tufted and the under parts more vermiculated with blackish.

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PROCEEDINGS

OF THE

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VOLUME XII

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(ELECTED DECEMBER 18, 1897)

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VOL. XII, PP. VII-XII DECEMBER 30, 1898

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

PROCEEDINGS.

The Society meets in the Assembly Hall of the Cosmos Club on alternate Saturdays at 8 p. m. Brief notices of the meetings, with abstracts of communications, are published in *Science.*

January 7, 1898—Special Meeting.

The President, Dr. L. O. Howard, delivered the annual address at Columbian University on the topic, 'The Gypsy Moth in Massachusetts: A Great Experiment in Economic Entomology.'*

January 15, 1898—285th Meeting.

The President in the chair and 51 persons present.

C. Hart Merriam discussed a recently issued biography of Audubon.

The program for the evening consisted of a symposium on the topic, ' Recent Additions to our Knowledge of the Cell,' with the following speakers: Frank Baker, D. G. Fairchild, H. J. Webber, and W. T. Swingle. The communications were illustrated by diagrams and lantern slides.

January 29, 1898—286th Meeting.

The President in the chair and 24 persons present.

The following communications were presented :

William Palmer: The Birds of the Pribilof Islands.†

---

*Bull. No. 11, New Series, Division of Entomology, U. S. Dept. of Agriculture.

†'Avifauna of the Pribilof Islands,' to be published as a chapter in the Report on the Fur Seal Islands, by David Starr Jordan, U. S. Treasury Department.

L. O. Howard: The European Hornet in America.

The remainder of the evening was occupied with an informal discussion on the classification of birds, F. A. Lucas, Theodore Gill, W. H. Ashmead, and William Palmer participating.

February 12, 1898—287th Meeting.

The President in the chair and 27 persons present.

L. O. Howard exhibited specimens of Mantidæ and Locustidæ collected by Dr. W. L. Abbott at Trong, Lower Siam, commenting particularly on the prevalence of aggressive resemblances among tropical Mantids.

The following communications were presented:

E. A. De Schweinitz: The Treatment of Animal Diseases with Antitoxic Serums.*

O. P. Hay: The Protospondyli and Aethiospondyli of A. S. Woodward.†

Theodore Gill: Classification of the Astacoidean Crustaceans.

February 26, 1898—288th Meeting.

The President in the chair and 57 persons present.

The evening was devoted to a symposium upon the topic, 'The Teaching of Biology,' with the following speakers: E. L. Morris, W. H. Dall, Erwin F. Smith, Theodore Gill, H. J. Webber, B. W. Evermann, Ch. Wardell Stiles, and Edward L. Greene.

March 12, 1898—289th Meeting.

The President in the chair and 26 persons present.

Theodore Gill exhibited and discussed a new text-book on zoology by Parker and Haswell.

M. B. Waite gave an illustration of fasciation in the black locust.

The following communications were presented:

Ch. Wardell Stiles: Practical Suggestions in Regard to Trichinosis.

Erwin F. Smith: Migula's 'System der Bakterien.'

F. C. Kenyon: Some Recent Advances in our Knowledge of the Nervous System.

---

* To be published as a Report of the Bureau of Animal Industry.

† Am. Nat., XXXII, No. 377, pp. 341-349, May, 1898, under the title, 'Classification of the Amioid and Lepisosteoid Fishes.

March 26, 1898—290th Meeting.

The President in the chair and 45 persons present.

The evening was devoted to a symposium on 'The Comparative Value of Factors Influencing the Distribution of Life,' with the following speakers: C. Hart Merriam, L. O. Howard, W. H. Dall, F. V. Coville, Theodore Gill, B. E. Fernow, B. W. Evermann, and F. W. True.

April 9, 1898—291st Meeting.

Ex-President Theodore Gill in the chair and 28 persons present.

Vernon Bailey exhibited specimens of sticks cut by beavers, explaining the methods pursued by the animal in this operation.

The following communications were presented:

O. P. Hay: Observations on the Cretaceous Fishes called by Professor Cope '*Portheus.*'*

W. H. Osgood: Notes on the Natural History of the Farallon Islands. (Illustrated by lantern slides.)

William Palmer: A Phase of Feather Repigmentation.

April 23, 1898—292d Meeting.

Ex-President W. H. Dall in the chair and 65 persons present.

Charles L. Pollard exhibited the fruit of *Poinciana regia* and of *Cæsalpinia bonducella*, commenting on their occurrence in south Florida.

The following communications were presented:

C. Hart Merriam: Life Zone Conformities in the Distribution of Oregon Ground Squirrels.

Ernest Seton Thompson: The Personality of Some of Our Wild Animals. (Illustrated by lantern slides.)

May 7, 1898—293d Meeting.

Vice-President B. E. Fernow in the chair and 60 persons present.

The topic for the evening was 'The Fauna and Flora of the Florida Keys,' illustrated by lantern slides, the speakers being O. F. Cook, E. L. Morris, and Charles L. Pollard.†

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* Zoological Bull., 2, No. 1, pp. 25-54, 1898.

† A portion of the topics discussed in this communication will form the basis for a report to be published in Contr. U. S. Nat. Herb.

May 24, 1898—294th Meeting.

The President in the chair and 20 persons present.

The following communications were presented:

F. C. Kenyon: Recent Experiments on the Nervous System of Arthropods, their Significance, and the Problems that Remain Unsolved.

Nathan Banks: The Scorpions of the Eastern United States.*

Gilbert H. Hicks: The Vitality of Seeds.

H. J. Webber: Researches on the Reproduction of Cycadaceous Plants.

October 22, 1898—295th Meeting.

The President in the chair and 37 persons present.

E. L. Morris commented on the frequency with which specimens of *Colocasia esculenta* in cultivation in Washington had bloomed during the past summer. He also cited a case of morning flowering in *Cereus grandiflorus.*

T. A. Williams noted the occurrence of a rare lichen, *Hydrothyria venosa*, at several localities in the West.

T. S. Palmer spoke of *Neomylodon*, an alleged living representative of a family of extinct edentates.

The following communications were presented:

J. N. Rose: Proposed Rearrangement of the Subfamily Agaveæ. (Illustrated by numerous living plants.) †

F. A. Lucas: The Fossil Bison of North America, with Description of a New Species. ‡

A. J. Pieters: Problems of Aquatic Vegetation. §

Gilbert H. Hicks: The Effect of Certain Fertilizers on the Germination of Seeds.

November 5, 1898—296th Meeting.

The President in the chair and 42 persons present.

F. V. Coville exhibited a piece of lava from Mt. St. Helens, bearing the impression of the bark of a pine.

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* To be published probably in Trans. Am. Ent. Soc.

† To be published in Contr. U. S. Nat. Herb.

‡ To be published in Proc. U. S. Nat. Mus.

§ To be published as a Bulletin of the Division of Botany, U. S. Dept. of Agriculture.

Albert F. Woods exhibited some leaves skeletonized by the small fresh-water crustacean *Cypridopsis.*

H. J. Webber noted the occurrence of seed production in some seedlings from a sport of *Clarkia pulchella.*

The following communications were presented:

D. G. Fairchild: The Dutch Botanical Gardens at Buitenzorg, Java. (Illustrated by numerous photographs.)

L. O. Howard: The Outbreak of the Fluted Scale in Portugal and Its Results.*

Chas. T. Simpson: The Destruction of the Pearly Fresh-water Mussels.†

F. A. Lucas: The Occurrence of Mammoth Remains on the Pribilof Islands.‡

November 19, 1898—297th Meeting.

The President in the chair and 31 persons present.

E. L. Morris gave an account of the ascent by a small snake of the polished nickel surface of a vertical stand-pipe.

F. W. True exhibited a copy of an entomological journal published in Japan, stating that it was probably the first journal of this nature issued in that country.

L. O. Howard exhibited posters prepared by the German government describing and figuring the Colorado potato beetle and the San José scale, and also one issued by the Russian government describing a destructive Russian grain beetle, *Anisoplia austriaca.*

The following communications were presented:

Cleveland Abbe: Climate and the Corn Crop.

H. J. Webber: A Comparison of Types of Fecundation of Flowering Plants.

December 3, 1898—298th Meeting.

The President in the chair and 40 persons present.

Upon invitation Professor A. D. Hopkins, of West Virginia, addressed the Society briefly, explaining a new method of illustrating specific and generic relationships by means of diagrams.

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* To be published as Bull. 18, New Series, Division of Entomology, Dept. of Agriculture.

† Substance embodied in a paper to be published by the U. S. Fish Commission.

‡ To be published in Science.

The following communications were presented:

Charles L. Pollard: Floral Asymmetry in *Chamæcrista.*

H. J. Webber: The Affinities of *Casuarina.*

O. F. Cook: Four Categories of Species.*

December 17, 1898—299th Meeting.

(NINETEENTH ANNUAL MEETING.)

The President in the chair and 32 persons present.

The annual reports of the Recording Secretary and Treasurer for the year 1898 were presented, and officers for the year 1899 were elected as follows:

President—Frederick V. Coville.

Vice-Presidents—Wm. H. Ashmead, Ch. Wardell Stiles, B. W. Evermann, F. A. Lucas.

Recording Secretary—H. J. Webber.

Corresponding Secretary—O. F. Cook.

Treasurer—F. H. Knowlton.

Additional Members of the Council—C. L. Marlatt, T. S. Palmer, Charles L. Pollard, F. W. True, M. B. Waite.

The following standing committees were appointed by the Chair:

On Communications—F. A. Lucas, chairman; Wm. H. Ashmead, L. H. Dewey, E. A. De Schweinitz, A. F. Woods.

On Publications—C. Hart Merriam, chairman; T. S. Palmer, F. H. Knowlton.

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*To be published in the American Naturalist

VOL. XII, PP. 1-3 JANUARY 27, 1898

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

NOTES ON FISHES COLLECTED BY E. W. NELSON ON THE TRES MARIAS ISLANDS AND IN SINALOA AND JALISCO, MEXICO.

BY BARTON WARREN EVERMANN,

Ichthyologist, U. S. Fish Commission.

While engaged in collecting other objects of natural history in Mexico during the summer of 1897, Mr. Nelson obtained a few fishes, which were submitted to the writer for identification and report.

The collection contains four species, one of which proves to be new. The specimens were obtained at Rosario, Ixtapa, La Laguna de Juanacatlan and the Tres Marias Islands.

Rosario is situated about 80 miles southeast from Mazatlan and about 18 miles from the sea. The specimens from that place were obtained from freshwater pools left by the drying up of that portion of the Rosario River. The exact locality was about 15 miles above tide.

Ixtapa is in the State of Jalisco, on the Ixtapa River, about 12 miles above the head of the Bay of Banderas. The specimens from Maria Magdalena Island came from the interior about 250 feet above tide level, from a small stream which communicates with the sea during the rainy season. Those from Maria Cleofa came from a small freshwater stream close to the sea, but communicating with it only in wet weather. Maria Magdalena and Maria Cleofa islands are the two most southern of the Tres Marias group, situated about 60 miles off the coast of Jalisco. La Laguna de Juanacatlan is in the Sierra de Juanacatlan, in western Jalisco, at an altitude of 6,500 to 7,000 feet.

This collection, though small, is of interest, in that it increases our knowledge of the distribution of the species, and probably indicates a close relation between the freshwater fish fauna of the Tres Marias Islands and that of the adjacent mainland.

LIST OF SPECIES.

Family **Atherinidæ**. The Silversides.

1. *Chirostoma humboldtianum* (Cuvier & Velenciennes).

The collection contains 5 specimens of this species. They do not differ materially from specimens from the City of Mexico, the type locality.

Head $3\frac{1}{4}$ to $4\frac{1}{4}$ in length of fish; depth $4\frac{1}{3}$ to $5\frac{1}{2}$; eye $3\frac{3}{4}$ to $4\frac{1}{2}$ in head; snout 3 to $3\frac{1}{2}$. Dorsal IV–I, 10 to 12; Anal I, 16 to 19; scales 46, 13 to 15 in a transverse series.

Family **Mugilidæ**. The Mullets.

2. *Agonostomus nasutus* Günther.

The collection contains one specimen from Ixtapa, 3 from Maria Magdalena, and 2 from Maria Cleofa.

The specimen from the mainland agrees well with those from the islands.

The specimens are from $2\frac{3}{4}$ to $4\frac{1}{4}$ inches in length and present the following measurements: Head $3\frac{1}{2}$ to 4; depth $3\frac{3}{4}$ to 4; eye $3\frac{3}{4}$ to $4\frac{1}{2}$ in head; snout $3\frac{4}{5}$ to 4; interorbital width $2\frac{3}{4}$ to $3\frac{1}{5}$; maxillary $3\frac{1}{4}$ to $3\frac{1}{3}$. Dorsal IV–I, 8; Anal II, 9; scales 42 or 43, 11 in transverse series.

Type locality, Rio Geronimo, Central America.

Family **Cichlidæ**. The Cichlids.

3. *Heros beani* Jordan.

Eleven specimens of this common species obtained at Rosario, July 27, in the same pools from which the specimens of *Awaous nelsoni* were taken.

Head $2\frac{5}{6}$; depth $2\frac{1}{2}$; eye 4; snout $2\frac{9}{10}$. Dorsal XV, 11; Anal V, 7; scales 6–30–11; pores in lateral line 19 + 11.

Type locality, Mazatlan, Sinaloa.

Family **Gobiidæ**. The Gobies.

4. *Awaous nelsoni*, new species.

The collection contains 8 specimens of a goby which proves to be an undescribed species of *Awaous*.

Type locality, Rosario River, at Rosario, Sinaloa, Mexico. Collector, E. W. Nelson, July 27, 1897.

Type No. 48836, U. S. Nat. Mus. Cotypes Nos. 48837, U. S. Nat. Mus.; 533 U. S. Fish Comm.; and 5793, L. S. Jr. Univ. Mus. Collector's No. 839.

Awaous nelsoni Evermann.

Head 3½; depth 6; eye 5¾ in head; snout 3; maxillary 2⅞. D. VI–11; A. 11; scales about 63. Body long, compressed, and tapering posteriorly; head large, quadrate; mouth large, nearly horizontal, lower jaw included; snout abruptly decurved; top of head flat, the interorbital with a slight median groove with a thin, raised edge on each side; maxillary reaching about to vertical of anterior edge of pupil. Teeth in bands on jaws, very small, the outer somewhat enlarged. Pectoral rays normal, the longest 1½ in head; ventrals completely united, the disk free from belly, 1¾ in head. Dorsal fins separated by a space about ⅔ diameter of eye; dorsal spines slender, weak, about 1⅗ in head; soft dorsal and anal similar, each free from caudal; caudal fin rather short and rounded, its middle rays about 1¼ in head. Inner edge of shoulder girdle with 3 dermal papillæ; gill-membranes broadly united to the isthmus; eye moderate, high up, the interorbital width equal to the eye's diameter. Scales ctenoid, very small, and irregularly crowded anteriorly, much larger posteriorly, about 15 rows counting from origin of soft dorsal downward and backward to the anal fin; head naked, but with slight indication of a few minute embedded scales on opercles. Color grayish; head mottled and blotched with dark; side with 7 or 8 black blotches, the largest under middle of pectoral fin; dorsals pale, crossed by several lines of black spots; caudal pale, with about 6 or 7 dark cross-bars; ventrals and anal pale; pectorals pale, dusted with dark specks and with a small dark blotch at base of upper rays. Length, 4 inches.

The 7 specimens taken as cotypes do not show any considerable variations from the type. The more important variations are indicated in the following description: Head 3⅖ to 3⅗; depth 5 to 6½; eye 5 to 6 in head; snout 2⅗ to 3. D. VI–11; A. 10 or 11; scales 60 to 70.

The number of scales seems to be the most unstable character, but this is partly due to the difficulty of counting them accurately. They are so crowded and irregularly arranged anteriorly as to make definite counting impossible.

Awaous nelsoni seems most closely related to *A. taiasica* (Lichtenstein), from which it differs in the larger scales on posterior part of body, the broader interorbital, the longer snout, and the darker coloration.

I take pleasure in naming this interesting species for Mr. Edward William Nelson, the well-known ornithologist, in recognition of his early work upon the fishes of Illinois, in 1874–'5.

VOL. XII, PP. 5-11 JANUARY 27, 1898

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

DESCRIPTIONS OF NEW BIRDS FROM THE TRES MARIAS ISLANDS, WESTERN MEXICO.

BY E. W. NELSON.

The specimens upon which the present paper is based were obtained by myself and my assistant, Mr. E. A. Goldman, on the Tres Marias Islands, off the west coast of Mexico, during May, 1897. Our visit there was a continuation of the work carried on in Mexico by the Biological Survey of the Department of Agriculture.

Special efforts were made to secure series of the resident land birds, in which we were quite successful. The study of these series, in connection with our collection from the adjacent mainland during the same season, indicates that most of the resident land birds of the islands, not already described, differ in a more or less marked degree from their nearest mainland relatives. In most cases the island birds cannot be considered more than geographical races, although a few differ sufficiently to be treated as species. Not a single species has been found on the islands which has not a closely related form on the mainland. The bird fauna as a whole will be treated in detail in a paper now in course of preparation.

Previous work on the Tres Marias may be briefly summarized as follows: In 1865–1867 the group was visited three times by Colonel A. J. Grayson, who made extensive collections of birds for the Smithsonian Institution. From these collections a number of new species and subspecies have been described at various times by Baird, Cassin, Lawrence, and Ridgway. In addition, Von

Madarasz has described a *Vireo* from a collection made there in 1881 by Mr. A. Forrer. Mr. Xantus is supposed to have visited the islands during his stay on the west coast of Mexico, but we have no definite information in regard to his trip.

I am indebted to Dr. C. Hart Merriam, Chief of the Biological Survey, for the opportunity to prepare the present paper. My thanks are due also to Mr. Robert Ridgway, Curator, and Dr. Chas. W. Richmond, Assistant Curator, of Birds in the U. S. National Museum, for continued favors during the progress of my work on Mexican birds.

All of the birds described below, except the Magdalena Wren, which seemed to be restricted to Magdalena Island, were taken on Maria Madre Island, and probably occur on the other islands also.

All measurements are in millimeters.

Columba flavirostris madrensis subsp. nov. Tres Marias Pigeon.

Type No. 156698, U. S. Nat. Mus., Biological Survey Coll., ♂ ad., Maria Madre Island, Mexico, May 13, 1897. Collected by E. W. Nelson and E. A. Goldman.

Description.—Differs from typical *C. flavirostris* in somewhat larger size; decidedly larger and longer bill and generally paler colors; lower border of greater wing coverts broadly margined with white as in *Columba gymnophthalma*. Dimensions of type: wing, 209; tail, 138; culmen, 17; tarsus, 26.

Average measurements of *Columba flavirostris.*—♂ (4 specimens): wing, 195.5; tail, 123.5; culmen, 13.7; tarsus, 24.7. ♀ (3 specimens): wing, 193; tail, 120.6; culmen, 14.1; tarsus, 25.3.

Average measurements of *C. flavirostris madrensis.*—♂ (4 specimens): wing, 202.7; tail, 129; culmen, 15.7; tarsus, 27.1. ♀ (3 specimens): wing, 201; tail, 127; culmen, 16.6; tarsus, 26.3.

A single specimen from the islands lacks the white margins on the greater wing coverts, but has all the other characters of the insular race, such as the large bill and pale colors. This is the only one among a dozen or more specimens examined which lacked this marking. The mainland yellow-billed pigeon not infrequently has a narrow margin of white on the borders of the greater coverts, but I have never seen one in which this character is so striking as on the ordinary island birds.

Leptotila capitalis subsp. nov. Tres Marias Dove.

Type No. 156709, U. S. Nat. Mus., Biological Survey Coll., ad. ♂, Maria Madre Island, Mexico, May 6, 1897. Collected by E. W. Nelson and E. A. Goldman.

Description of type.—Forehead, and crown to line between middle of orbits, pale creamy drab, shading abruptly into the purplish iridescence which overlies remainder of crown and back of neck. This purplish iridescence on the neck ends abruptly just in front of shoulders, and is bordered by a narrow band of feathers tipped with greenish iridescence. Entire dorsal surface, including wings and middle pair of tail feathers, brown with an olive wash, except on tail and upper tail coverts. Throat distinctly whitish; remainder of lower side of neck and thence back over chest delicate creamy lilac; abdomen and under tail coverts white with a pale wash of buffy brown on edges of some of the feathers. Flanks dull buffy brown; tail feathers, except middle pair, blackish tipped with white—this tipping broadest on outer pair of feathers; under wing coverts and axillars pale cinnamon. Dimensions of type: wing, 152; tail, 109; culmen, 18.5; tarsus, 33.

Averages of *Leptotila fulviventris brachyptera.*—♂ (5 specimens): wing, 147.8; tail, 108.8; culmen, 16; tarsus, 31.3. ♀ (3 specimens): wing, 144.3; tail, 104.6; culmen, 15.6; tarsus, 30.6.

Averages of *L. capitalis.*—♂ (5 specimens): wing, 152.5; tail, 110.6; culmen, 17.9; tarsus, 32 2. ♀ (3 specimens): wing, 151.6; tail, 107; culmen, 18.8; tarsus, 30.6.

This species can be distinguished at once from its nearest mainland relatives, *P. fulviventris* and *P. fulviventris brachyptera*, by its paler colors and larger bill. Stragglers of typical *brachyptera* occur on the islands, as shown by a specimen obtained there by Col. Grayson, now in the National Museum. This specimen is identical with the mainland bird and shows no sign of approach to the insular species.

Buteo borealis fumosus subsp. nov. Tres Marias Red-tailed Hawk.

Type No. 156714, U. S. Nat. Mus., Biological Survey Coll., ad. ♂, Maria Madre Island, Mexico, May 6, 1897. Collected by E. W. Nelson and E. A. Goldman.

Description.—Entire head and neck nearly uniform smoky brown, with scarcely a trace of lighter markings on throat or chin. Back and wings blackish brown; breast and remainder of lower surface, except neck, heavily marked with dull rusty, smoky brown, and dull whitish or buffy; no sign of lighter area on breast; the markings on ventral surface are in the form of indistinct barrings which are most clearly defined on the tibia. Dimensions of type: wing, 375; tail, 206; culmen, 26; tarsus, 81.

Averages of *Buteo b. socorroensis.*—♂ (2 specimens): wing, 387.5; tail, 207.5; culmen, 25; tarsus, 80. ♀ (1 specimen): wing, 425; tail, 221; culmen, 30; tarsus, 86.

Averages of *B. borealis fumosus.*—♂ (3 specimens): wing, 373.3; tail, 207.3; culmen, 26; tarsus, 81.3. ♀ (1 specimen): wing, 412; tail, 214; culmen, 30; tarsus, 84.

The Tres Marias form is darker and more uniformly marked below, and lacks the lighter areas on throat and breast that are found in *B. borealis socorroensis.* On the dorsal surface *fumosus* is readily distinguishable from *socorroensis* by the uniformly smoky brown head and neck, the rusty edgings to the neck and wing feathers of the latter bird being entirely absent. Curiously enough, although the Tres Marias Islands are only about one-fifth as far from the coast as Socorro Island, yet the Tres Marias race is more distinct from *B. borealis calurus* than is *socorroensis.*

Polyborus cheriway pallidus subsp. nov. Tres Marias Caracara.

Type No. 156715, U. S. Nat. Mus., Biological Survey Coll., ♂ ad., Maria Madre Island, Mexico, May 3, 1897. Collected by E. W. Nelson and E. A. Goldman.

Description.—General pattern of coloration as in *P. cheriway*, but much paler or lighter brown. The darkest adult from the islands is somewhat paler than the palest adult from the mainland in the considerable series I have examined. The same proportionately paler colors prevail on immature birds from the islands. The terminal black band on the tail of the island bird averages narrower, and the other dark bars on the tail are fainter. The light and dark markings on back at base of neck are in the form of regular bars instead of being broken into a roughly wavy pattern by the oval form of the black areas on the feathers, as in specimens of *cheriway* from the mainland of Mexico. The wing, tail, and tarsus average shorter than in *cheriway* of the Mexican mainland, bill about the same. Dimensions of type: wing, 370; tail, 198; culmen, 32; tarsus, 86.

Averages of *Polyborus cheriway* (from mainland of Mexico).—♂ (4 specimens): wing, 392; tail, 208.7; culmen, 32.5; tarsus, 90.7. ♀ (2 specimens): wing, 396.5; tail, 217.5; culmen, 33.5; tarsus, 89.

Averages of *P. cheriway pallidus.*—♂ (4 specimens): wing, 370.7; tail, 194; culmen, 32; tarsus, 86.5. ♀ (4 specimens): wing, 386.5; tail, 205; culmen, 32.7; tarsus, 88.

A specimen from the mainland adjacent to the Tres Marias group approximates the island form, and a series might prove the birds from that district to be intermediate.

Trogon ambiguus goldmani subsp. nov. Goldman's Trogon.

Type No. 156752, U. S. Nat. Mus., Biological Survey Coll., ad. ♂, Maria Madre Island, Mexico, May 10, 1897. Collected by E. W. Nelson and E. A. Goldman.

Description.—Males decidedly greener above than typical *ambiguus*, with very little of the coppery iridescence characteristic of the latter. Females and young differ still more, their backs being decidedly ashy and having much paler rufous on middle tail feathers; exposed parts of scapulars, tertiaries, and wing coverts gray, mottled with fine, wavy, black lines, with slight indication of the brown which forms the main color of these feathers in *ambiguus* proper; colors of lower parts decidedly paler. In size the two forms differ but little. Dimensions of type: wing, 128; tail, 148; culmen, 20; tarsus, 17.

Averages of *Trogon ambiguus.*—♂ (4 specimens): wing, 131; tail, 161.2; culmen, 19.5; tarsus, 16.7. ♀ (1 specimen): wing, 127; tail, 170; culmen, 18.5; tarsus, 17.

Averages of *T. ambiguus goldmani.*—♂ (4 specimens): wing, 130.7; tail, 153.2; culmen, 19.7; tarsus, 17. ♀ (1 specimen): wing, 134; tail, 167; culmen, 19; tarsus, 18.

Nyctidromus albicollis insularis subsp. nov. Tres Marias Parauque.

Type No. 156765, U. S. Nat. Mus., Biological Survey Coll., ad. ♂, Maria Madre Island, Mexico, May 10, 1897. Collected by E. W. Nelson and E. A. Goldman.

Description.—The island birds can be distinguished from *N. albicollis*, of the adjacent mainland, by uniformly duller, more grayish brown colors of entire dorsal surface and broader transverse dark bars on lower surface, especially on abdomen and flanks. The culmen and tarsus are relatively shorter and wings and tail longer. Dimensions of type: wing, 173; tail, 169; culmen, 11; tarsus, 26.

Averages of *Nyctidromus albicollis* (from mainland of Mexico).—♂ (5 specimens): wing, 158.4; tail, 146.6; culmen, 11.2; tarsus, 26.5. ♀ (5 specimens): wing, 152.6; tail, 136; culmen, 11; tarsus, 25.9.

Averages of *N. albicollis insularis.*—♂ (5 specimens): wing, 170.6; tail, 162.4; culmen, 10.9; tarsus, 25.9. ♀ (5 specimens): wing, 168.4; tail, 154.4; culmen, 11.6; tarsus, 25.8.

A notable feature of *insularis*, shown in the series before me, is its remarkable constancy of coloration compared with the amount of variation in the large number of mainland specimens examined. The latter show a wide range of color from grayish to rufous. A single specimen in the island series has a slight rufous shading, but agrees with the others in size. In the mainland series a specimen from Ixtapa, Jalisco, is colored like *insularis*, but agrees with other birds from the same region in its smaller size.

Myiopagis placens minimus subsp. nov. Little Green Flycatcher.

Type No. 156817, U. S. Nat. Mus., Biological Survey Coll., ad. ♂, Maria Madre Island, Mexico, May 10, 1897. Collected by E. W. Nelson and E. A. Goldman.

Description.—Similar to *M. placens*, but grayer, especially about head and neck; top of head and neck lighter than rest of dorsal surface instead of darker, as in the mainland form. The island form averages smaller than true *placens*. Dimensions of type: wing, 64.5; tail, 66; culmen, 12; tarsus, 19.5.

Averages of *Myiopagis placens.*—♂ and ♀ (8 specimens): wing, 68.2; tail, 65.8; culmen, 11.2; tarsus, 19.1.

Averages of *M. placens minimus.*—♂ (5 specimens): wing, 64.9; tail, 64.8; culmen, 11.8; tarsus, 19.4. ♀ (5 specimens): wing, 65.5; tail, 63; culmen, 11.6; tarsus, 19.2.

In the National Museum is a typical specimen of *placens* taken on the Tres Marias by Col. Grayson, showing that it occurs there as a straggler.

Cardinalis cardinalis mariæ subsp. nov. Tres Maria Cardinal.

Type No. 156907, U. S. Nat. Mus., Biological Survey Coll., ad. ♂, Maria Madre Island, Mexico, May 3, 1897. Collected by E. W. Nelson and E. A. Goldman.

Description.—Males most like those of *C. cardinalis igneus*, but red of under parts deeper and richer, lacking the pinkish suffusion notable in *igneus;* color of back also richer, and feathers less edged with gray.

The females of the two forms are more distinct than the males. *C. mariæ* has a large whitish throat area, and the entire abdomen is whitish, thus confining the main buffy area of lower parts to a broad pectoral band. The bill is more swollen; the wing is longer and tail shorter than in *igneus.* Dimensions of type: wing, 101; tail, 103; culmen, 20; tarsus, 29.

Averages of *Cardinalis c. igneus.*—♂ (4 specimens): wing, 94.5; tail, 106; culmen, 20; tarsus, 26.6. ♀ (3 specimens): wing, 91.6; tail, 104.3; culmen, 20; tarsus, 26.8.

Averages of *C. c. mariæ.*—♂ (4 specimens): wing, 97.7; tail, 98.7; culmen, 20.5; tarsus, 28.9. ♀ (4 specimens): wing, 91.7; tail, 89.7; culmen, 19.9; tarsus, 28.2.

Vireo hypochryseus sordidus subsp. nov. Tres Marias Vireo.

Type No. 156898, U. S. Nat. Mus., Biological Survey Coll., ad. ♂, Maria Madre Island, Mexico, May 13, 1897. Collected by E. W. Nelson and E. A. Goldman.

Description.—Differs from *V. hypochryseus* in duller, more olive green on dorsal surface, and dingier, more greenish yellow under parts. The bill is darker horn color and larger than in true *hypochryseus.* Dimensions of type: wing, 66; tail, 61; culmen, 13; tarsus, 21.

Averages of *Vireo hypochryseus.*—♂ (5 specimens): wing, 63.4; tail, 57.8; culmen, 12.4; tarsus, 19.5. ♀ (2 specimens): wing, 63; tail, 55.5; culmen, 12; tarsus, 20.

Averages of *V. hypochryseus sordidus.*—♂ (7 specimens): wing, 67.3; tail, 60.3; culmen, 13.3; tarsus, 21. ♀ (3 specimens): wing, 66.3; tail, 60.7; culmen, 12.7; tarsus, 21.1.

Melanotis cærulescens longirostris subsp. nov. Tres Marias Blue Mockingbird.

Type No. 156923, U. S. Nat. Mus., Biological Survey Coll., ad. ♂, Maria Madre Island, Mexico, May 4, 1897. Collected by E. W. Nelson and E. A. Goldman.

Description of type.—General color dull slaty blue with a grayish cast; top of head and all of neck and breast paler than rest of body; remainder of lower parts dull grayish blue (becoming smoky bluish in some specimens); back, rump, scapulars, and wing coverts dull slaty blue. Two central tail feathers and outer web of other rectrices same as back; rest of tail dull black; lores, ear coverts, and fore part of chin black. Dimensions of type: wing, 101; tail, 104; culmen, 29; tarsus, 32.

Averages of *Melanotis cærulescens.*—♂ (4 specimens): wing, 115.5; tail, 125.5; culmen, 24.9; tarsus, 31.2. ♀ (1 specimen): wing, 106; tail, 111; culmen, 24.5; tarsus, 29.

Averages of *M. cærulescens longirostris.*—♂ (3 specimens): wing, 104.6; tail, 105; culmen, 29; tarsus, 30.6. ♀ (1 specimen): wing, 108; tail, 102; culmen, 29; tarsus, 32.

The grayer colors, smaller size, and larger bill are the main points distinguishing this form from typical *cærulescens.*

Thryothorus lawrencii magdalenæ subsp. nov. Magdalena Island Wren.

Type No. 156943, U. S. Nat. Mus., Biological Survey Coll., ad. ♂, Magdalena Island, Mexico, May 28, 1897. Collected by E. W. Nelson and E. A. Goldman.

Description of type.—Back warm umber brown with a slight grayish wash; top of head and neck deeper, purer rufescent than back; rump and upper tail coverts lighter, brighter rufescent than back; wings and middle tail feathers rufous brown; tail irregularly barred with blackish brown and whitish, the latter color more or less heavily shaded with dull rufous brown; a distinct white supra-loral stripe from base of bill to nape; sides of head and neck indistinctly marked with blackish lines; chin, throat, breast, and middle of abdomen white; sides of breast and flanks reddish brown; under tail coverts whitish with a shaft line and spot (or bar) of blackish brown near tips. Dimensions of type: wing, 55; tail, 55; culmen, 16.5; tarsus, 21.

Average of 3 adult males of *Thryothorus lawrencii.*—Wing, 60; tail, 55.6; culmen, 17.2; tarsus, 22.

This form combines certain characters of typical *T. felix* with those of *T. lawrencii.* The rufous on the crown and nape is even deeper than in typical *felix,* while the white lower parts are as in true *lawrencii.*

Compared with a specimen of *felix* from Ometepec, Guerrero, believed to be typical, *magdalenæ* has a pure white area covering most of lower parts in place of the rich rufous of *felix.* The rufous of the flanks is paler; under tail coverts less barred; crown and rump nearly the same shade of rufous; back a little grayer; sides of head much less heavily streaked with black.

From *lawrencii* it may be distinguished by its much richer colored or more rufous upper parts, by somewhat heavier dark streaking on the side of the head and neck, and by the richer wash of rufous on the flanks.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

MAMMALS OF TRES MARIAS ISLANDS, OFF WESTERN MEXICO.

BY C. HART MERRIAM.

Mr. E. W. Nelson spent the month of May, 1897, on the Tres Marias Islands in the interest of the Biological Survey of the U. S. Department of Agriculture. This visit has resulted in a large increase in knowledge of the fauna and flora of the islands. The new birds are described by Mr. Nelson in a preceding brochure of the present volume; the new mammals are named in the present paper.

In the Mammal volume of the 'Biologia Centrali-Americana' it is stated that according to Mr. Forrer, a collector who visited the islands in 1881, only three indigenous land mammals, besides bats, occur there. These are a rabbit, a raccoon, and a pigmy opossum. Mr. Nelson obtained all of these and two additional genera, a rat (*Oryzomys*) and a white-footed mouse (*Peromyscus*), and these in spite of Mr. Forrer's statement that "the inhabitants know of no rats or mice whatever in the islands, except, of course, the cosmopolitan *Mus decumanus*" (p. 212). The introduced rat brought back by Mr. Nelson is not the common or Norway rat (*Mus decumanus*), but the Roof rat or gray phase of the Black rat (*Mus rattus*).

Mr. Nelson and his assistant, Mr. E. A. Goldman, collected 146 specimens of mammals, representing nine species, of which the introduced rat is one, three are bats, and five are indigenous terrestrial land mammals. Of the latter, the rabbit is peculiar to the islands, and was described by Allen in 1877; the remaining four I have compared critically with the most closely related species from the mainland, and find that they differ in such pronounced characters that I am forced to describe them as distinct. One of the bats also is here described as new.

The raccoon was recorded in 'Biologia' as the South American *Procyon cancrivorus*, but with a series of eight specimens before me I am unable to detect any characters by which it can be referred to that species. Its affinities, on the other hand, are distinctly with *P. lotor* and *P. lotor hernandezi*, of which it appears to be merely a pale form, possessing slight though constant cranial differences. In view of these facts, I have described it as a new subspecies of *lotor*. Those who insist on intergradation as the touchstone of subspecies will have to set it up as a full species.

The alleged occurrence of *P. cancrivorus* on the Tres Marias is cited in 'Biologia' "as furnishing another instance of the peculiar affinity of their fauna to that of Southern Central America" (p. 209). Mr. Nelson's collections, however, show that not only the raccoon and all the other mammals, but also the birds, reptiles, and plants, are closely related to species now living on the adjacent mainland of Mexico.

One of the bats obtained by Mr. Forrer is recorded by Mr. Thomas as a young specimen of *Chœronycteris mexicanus.* Inasmuch as this species was not obtained by Mr. Nelson, whereas the commonest bat of the island, a *Glossophaga*, was not recorded from Forrer's collection, and since the two genera are closely related, is it not possible that a reëxamination of the Forrer specimen will show it to be a *Glossophaga* instead of a *Chœronycteris?* Assuming this to be the case, 10 indigenous land mammals are known from the islands. Of these, five, or exactly half, are bats; of the others, one is a Marsupial; one a Carnivore, and three are Rodents.

Of marine mammals three are recorded, a seal and two porpoises, but since only one of these was obtained, the identification of the other two is uncertain.

Marmosa insularis sp. nov. Tres Marias Pigmy Opossum.

Type from Maria Madre Island Mexico. No. 89215 ♂ ad., U. S. Nat. Mus., Biological Survey Coll. Collected May 16, 1897, by E. W. Nelson and E. A. Goldman. Original No. 11028.

Characters.—Size and general appearance as in *M. canescens*, but ears larger, tail longer, fore feet smaller, color more fulvous, skull longer and more slender.

Color.—Upper parts drab brown suffused with pale dull fulvous, purest and strongest on sides of neck; black rings around eyes broader, and reaching farther forward on sides of nose, than in *M. canescens;* median facial stripe buffy fulvous, narrower and more sharply defined than in *canescens;* under parts buffy yellow, deepest on throat and breast. In the 4 specimens examined there is no white on the tail; *canescens* commonly has the terminal part white.

Cranial characters.—Skull similar to that of *canescens* but longer, decidedly narrower and more slender; brain case more rounded; rostrum, palate, and base of skull between audital bullæ conspicuously narrower.

Measurements.—Type specimen: Total length 270; tail vertebræ 167; hind foot 19.5. Average of 3 males from type locality: Total length 285; tail vertebræ 170; hind foot 20.

Remarks.—Five specimens of this pretty little opossum were obtained on Maria Madre Island and present practically no individual variation. Mr. Nelson states that the species was common in the forest on top of the ridge which extends along the middle of Maria Madre Island.

Oryzomys nelsoni sp. nov. Nelson's Rice Rat.

Type from Maria Madre Island, Tres Marias Islands, Mexico. No. 89200 ♂ ad., U. S. Nat. Mus., Biological Survey Collection. Collected May 13, 1897, by E. W. Nelson and E. A. Goldman. Original No. 11022.

Characters.—Size large (decidedly larger than *O. mexicanus*); tail exceedingly long and nearly naked; ears medium, scant haired and rather pale; color yellowish fulvous; skull large and massive.

Color.—Upper parts dull yellowish fulvous, slightly darkened on head and back by blackish hairs, becoming pale buffy ochraceous on flanks and thighs; underparts white, the plumbeous underfur showing through in places; tail dark except on proximal ⅓ or ½ of under side which is pale yellowish; hind feet scantily haired with whitish hairs.

Cranial and dental characters.—Skull very large and massive, increasing in length (but not in breadth) with age; interparietal very broad anteroposteriorly. Contrasted with *O. mexicanus* Allen, the skull is very much larger and heavier (even the ♀ being much larger than the ♂ of *mexicanus*); the rostrum decidedly larger; the interparietal broader anteroposteriorly, and the molar teeth relatively as well as actually much broader.

Measurements.—Type specimen, ♂ ad.: Total length 342; tail vertebræ 190; hind foot 38. An adult ♀: Total length 320; tail vertebræ 185; hind foot 37. Average of 2 adult males from type locality: Total length 343; tail vertebræ 190.5; hind foot 38.5.

Remarks.—Mr. Nelson found this new species living in damp thickets and about springs near the summit of Maria Madre Island, where four specimens were obtained.

Peromyscus madrensis sp. nov. Tres Marias Mouse.

Type from Maria Madre Id., Tres Marias Islands, Mexico. No. 89223 ♂ ad. U. S. Nat. Mus., Biological Survey Coll. Collected May 18, 1897, by E. W. Nelson and E. A. Goldman. Orig. No. 11040.

Characters.—Size rather large; tail long and scant haired; ears medium; color dull pale fulvous; skull without superciliary ridges. In general, similar to *P. spicilegus* Allen, but much larger, with longer tail and shorter ears.

Color.—Upper parts pale dull fulvous (almost ochraceous buff) with an indistinct darker dorsal band on posterior half of back; under parts, lips and feet white; a salmon or fulvous pectoral spot or streak usually present; a dark spot on upper side of ankle; eyelids dark; ears essentially same color as body; tail dark above and at tip all round; whitish below.

Cranial characters.—Skull rather flat and smoothly rounded; rostrum elongate; no supraorbital ridges. Compared with *P. spicilegus*, its nearest known ally from the mainland of Mexico, the skull of *P. madrensis* is larger, the brain case decidedly broader and flatter; the molar series of teeth actually of the same length (relatively shorter) and somewhat broader.

Measurements.—Type specimen: Total length 222; tail vertebræ 119; hind foot 26. Average of 12 specimens from type locality: Total length 224; tail vertebræ 120; hind foot 26.

Remarks—This mouse, according to Mr. Nelson's notes, is the most common rodent on the islands. He says: "Specimens were taken on all three islands. They were generally distributed in the forest above the shore belt which is infested by land crabs, and were found more commonly about the fig trees on the high interior ridge of Maria Madre than elsewhere." Specimens from Cleofa Id. are larger than those from Maria Madre Id. (average of 3: total length 229.5; tail vertebræ 120; hind foot 27.8) and have larger and heavier skulls. Two specimens from Magdalena Id. have a pale saffron-yellow wash on the belly, probably due to staining.

Mus rattus Linn. Introduced Rat.

Mr. Nelson states that this introduced rat, of which he brought back two specimens, was found in small numbers over most parts of Maria Madre Id., where it lives in the forest like the native mice.

Lepus graysoni Allen. Tres Marias Cottontail.

Lepus graysoni Allen, Monog. N. Am. Rodentia, 347–348, 1877. Type from Tres Marias Ids., Mexico.

Mr. Nelson obtained 16 specimens of this very desirable rabbit. He states that the species occurs abundantly on the two larger islands, Maria Madre and Magdalena, and the small San Juanito, and is reported to occur on Maria Cleofa Island also.

Procyon lotor insularis subsp. nov. Tres Marias Raccoon.

Type from Maria Madre Island, Tres Marias Ids., Mexico. No. 88978 ♂ old, U. S. Nat. Mus., Biological Survey Coll. Collected May 10, 1897, by E. W. Nelson and E. A. Goldman. Orig. No. 10985.

Characters.—Similar to *P. lotor* and *hernandezi* but smaller and paler; ears smaller and only slightly marked at base; top of head grayer.

Cranial characters.—Skull in general similar to those of *P. lotor* and *hernandezi* but relatively shorter; frontals at and behind plane of postorbital processes broader; squamosal arm of zygomatic arch more expanded vertically; mastoid processes decidedly shorter and thicker; pterygoids squarely truncate anteriorly and of even breadth throughout (as seen from below), instead of tapering anteriorly to a thin point or scale as in both *lotor* and *hernandezi;* audital bullæ slightly smaller than in *hernandezi,* decidedly smaller and less inflated than in *lotor.*

Dental characters.—Premolars somewhat larger and more crowded than in *lotor;* upper carnassial as in *lotor*—smaller than in *hernandezi;* first upper molar about the same size as in *lotor* and similar in form, smaller than in *hernandezi* and much less quadrate.

Measurements.—Type specimen ♂ ad.: Total length 854; tail vertebræ 286; hind foot 132. An adult ♀: Total length 735; tail vertebræ 232; hind foot 126. Average of 5 adult males from type locality: Total length 841; tail vertebræ 287; hind foot 131.

Remarks.—Mr. Nelson found the Raccoon common on the two larger islands, Maria Madre and Maria Magdalena, but saw no signs of them on Maria Cleofa although told that they occur there sparingly.

? **Zalophus californianus** (Lesson). Sea-Lion.

In the absence of positive knowledge as to the identity of the Tres Marias seal, it is referred provisionally to the above species. It is of course possible that the Guadalupe fur-seal (*Arctocephalus townsendi*) may occur here also.

Mr. Nelson's notes contain the following: "A large seal or sea-lion, called *lobo marino* or sea wolf by the Mexicans, was reported to occur at several places on the rocky shores of Maria Magdalena and Maria Cleofa Islands. We heard of them first before leaving San Blas and again when we reached the islands. From the accounts received it was evident that they had been hunted for sport by various visitors until they had become comparatively scarce. We made careful inquiries, and, after learning of the location of the places most frequented by them on both islands, visited these places under the guidance of a tortoise-shell hunter who was very familiar with the shore. Only a single seal was seen; it was on a rocky islet off the shore of Maria Cleofa, and took to the water and disappeared before we could get a shot. Our guide informed me that at times the seals disappear from the islands for a few days, and this may account for our failure to find them in their usual haunts. The consensus of opinion among the residents of Maria Madre Island was that these animals are now very scarce. Formerly they were found at many places, but at present a rocky point on the northwest side, and a jutting reef on the south side of Maria Magdalena Island, and some islets off the west shore of Maria Cleofa, are the landing places used by the remnants of the considerable number that once lived here. They are doubtless doomed to speedy extinction."

Rhogeëssa parvula H. Allen. Tres Marias Rhogeëssa.

Rhogeëssa parvula H. Allen, Proc. Acad. Nat. Sci. Phila., 285, 1866. Type from Tres Marias Ids., Mexico.

A single badly mutilated specimen of this little known bat was shot on Maria Madre Id., where, according to Mr. Nelson's notes, it is "not uncommon in the forest."

Myotis nigricans (Maximilian). Maximilian's Black Bat.

Mr. Thomas states that "a specimen of this species was obtained by Mr. Forrer in the Tres Marias Islands." (Biologia Centrali-Americana, Mammalia, 206, 1881.)

Otopterus mexicanus (Saussure). Big-eared Bat.

Macrotus mexicanus Saussure, Rev. et Mag. de Zool., 2e sér. XII, 486–487, 1860. Type from Yautepec, Morelos, Mexico.

This large long-eared bat is very common on Maria Madre Id., where Mr. Nelson collected 52 specimens. He found it in the daytime in two or three caves, and also in an old unused warehouse. The females were heavy with young at the time of his visit (May, 1897). I have compared Mr. Nelson's Tres Marias specimens with specimens collected by him near the type locality of Saussure's '*Macrotus mexicanus*' in the State of Morelos, Mexico, and find no tangible differences except that the ears of the island specimens are slightly the larger. I have also compared both series with a fine series of topotypes of *Otopterus bulleri* (H. Allen) from Bolaños, Jalisco, and am unable to find any characters on which the latter form can stand.

Glossophaga mutica sp. nov. Tres Marias Glossophaga.

Type from Maria Madre Id., Tres Marias Ids., Mexico. No. 89271 ♂ ad., U. S. Nat. Mus., Biological Survey Coll. Collected May 8, 1897, by E. W. Nelson and E. A. Goldman. Orig. No. 10976.

Characters.—Similar to *G. soricina* (Pallas) and *G. truei* H. Allen, but differing in proportions and color—reddish brown instead of gray or sooty.

Color.—Fur of upper parts with basal ¾ dull white; apical ¼ dull cinnamon brown; underparts similar but much paler.

Cranial and dental characters.—In the absence of authentic skulls of *G. soricina* and *truei* for comparison it is impossible to differentiate the cranial characters of *G. mutica.* The rostrum is rather broad, flat, and swollen; a rounded protuberance over each orbit marks the junction of the rostrum with the braincase; the braincase is abruptly elevated and strongly inflated and arched; the basisphenoid is strongly keeled along the median line and its posterior fourth is abruptly elevated and has a pocket or fossa on each side between the audital bullæ, and on the same plane with the basioccipital; the zygomatic arches are slender, nearly parallel, rods; the upper canines divaricate so strongly that they are conspicuous when the skull is viewed from above; the premolars are narrow and well spaced; the molars are small and weak.

Measurements of type specimen, ♂ ad.: Total length (in flesh) 65 mm.; tail vertebræ (in flesh) 8; [following measurements from dry skin] forearm 35.5; metacarpal of 3d (longest) digit 35.5; tibia 14; ear from anterior basal angle 9; tragus from outer base 4.5.

Remarks.—Mr. Nelson obtained 37 specimens of this new *Glossophaga* on Maria Madre Id., where he found it inhabiting caves. Many of the females contained partly developed embryos.

Chœronycteris mexicana Tschudi. Tschudi's Bat.

Chœronycteris mexicana Tschudi, Fauna Peruana, I, 72–73, 1844. Type from Mexico.

"An immature specimen of this somewhat rare species is contained in Mr. Forrer's Tres Marias collection."—(Mr. Thomas in Biologia Centrali-Americana, 207, 1881). As already suggested, it would be worth while to reëxamine this specimen with reference to the possibility of its being *Glossophaga mutica*.

Lasiurus borealis mexicana (Sauss.). Mexican Red Bat.

Atalapha mexicana Saussure, Rev. et Mag. de Zool., 2e sér. XIII, 91, March, 1861. Type from Mexico.

This species was not obtained by Mr. Nelson, but is recorded by Thomas (under the old name *Atalapha frantzii*) as collected by Forrer on the Tres Marias. (Biologia, Mammalia, 205, 1881.)

? Phocæna communis Lesson. Common Porpoise.

Mr. Nelson states that "a porpoise, supposed to be this species, was common around the shores of the Tres Marias Islands, and also in bays and at the mouths of streams or lagoons along the coast of the mainland. They were always seen in the belt of shallow discolored water within a short distance of shore. As soon as the blue water was reached, with a depth of over 40 fathoms, the other species, *Prodelphinus longirostris*, was encountered. The present species was seen in schools of from ten to thirty or forty individuals swimming in loose order. At Maria Madre they came into the bay and close along shore early in the morning."

Prodelphinus longirostris (Gray). Long-nosed Porpoise.

Mr. Goldman shot a porpoise 12 to 15 miles off the islands, which Mr. F. W. True has kindly identified as *Prodelphinus longirostris* (Gray). Mr. Nelson states that there were probably 200 in the school from which this specimen was secured, and that a number of such schools were seen between San Blas and the islands.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

A NEW SPECIES OF EVOTOMYS FROM BRITISH COLUMBIA.

BY VERNON BAILEY.

Since the publication of my revision of the genus *Evotomys* in the Proceedings of the Biological Society last May,* a large series of specimens has been collected in the Pacific Coast region from northern California northward into British Columbia. The known ranges of several species have been considerably extended, and one form, inhabiting the low coast country of southern British Columbia, proves to be undescribed. It seems to be entirely distinct from neighboring species and worthy of full specific rank. In external characters it most nearly resembles *E. wrangeli*, but in cranial characters shows the opposite extreme of development in the short, wide skull. With its geographically nearest neighbors, *E. occidentalis* and *E. saturatus*, on the south, it shows no close affinities, being distinguished from them at a glance by its very short tail and smaller size.

Evotomys caurinus sp. nov.

Type from Lund, east shore of Malaspina Inlet, British Columbia. No. 89460, ♂ ad., U. S. Nat. Mus., Biological Survey Coll. Collected July 18, 1897, by Edward A. Preble. Original No. 2147.

Geographic distribution.—The coast region of British Columbia east of the Strait of Georgia and south to the Frazer River.

General characters.—Size rather small; colors dark; tail very short; skull short and wide, with narrow rostrum and rather small audital bullæ.

Color.—In *summer:* dorsal area well defined, dark, rich, chestnut darkened with black tipped hairs; sides sepia gray tinged with pale buff; spots over side glands of males whitish or dusky; face clear dark gray; belly washed with whitish or rarely buffy; ears dusky, scantily haired; tail bicolor, chestnut or dusky above with blackish tip, buffy below; feet soiled whitish or slightly dusky. In *winter:* dorsal area brighter, more rufescent than in summer; sides clearer gray. *Young:* darker than adults, with dusky bellies, feet and tails.

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* Proc. Biol. Soc. Wash., XI, 113–138, May 13, 1897.

Cranial characters.—Skull short and wide with spreading zygomata and very narrow nasals and rostrum; nasals truncate posteriorly and terminating even with ends of premaxillæ; audital bullæ small and flattened compared with those of *occidentalis* or *saturatus*, about equal to those of *wrangeli* but wider and flatter; incisors small and slender; molars small and crowded longitudinally; anterior loop of second and third upper molars usually indented; middle pair of triangles usually confluent in each lower molar.

Measurements of type specimen.—(Measured in flesh by E. A. Preble): total length, 135; tail vertebræ, 34; hind foot, 18. Average of 5 adults from type locality: total length, 135; tail vertebræ, 36; hind foot, 18. *Skull* of type: basal length, 21; nasals, 6.2; zygomatic breadth, 13.3; mastoid breadth, 10.8; alveolar length of upper molar series, 4.9.

Remarks.—The type series of 10 specimens shows only summer pelage and young; a specimen taken at Agassiz, B. C., Dec. 6, is in nearly full winter pelage.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

DESCRIPTION OF A NEW DEER (*DORCELAPHUS TEXANUS*) FROM TEXAS AND NORTHERN MEXICO.

BY EDGAR A. MEARNS.

The small white-tailed deer of Texas differs so materially in size, proportions, coloration, and cranial characters from the other members of the *Dorcelaphus americanus** group as to necessitate its separation. It may be known by the following description:

Dorcelaphus texanus new species. Texan Deer.

Type from Fort Clark, Kinney County, Texas. No. 4288, author's collection.† Adult male. Collected December 25, 1897, by Dr. Edgar A. Mearns.

General characters.—Size small; ears relatively small, with black on edges and tip; horns small and strongly incurved; limbs relatively short; molar and premolar teeth very large; general color pale; coat fine and long.

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* In the Proceedings of the Biological Society of Washington, vol. X, February, 1896, page 25, Mr. Outram Bangs reverted to the specific name *americanus* with the following remark: "The name *Cervus virginianus* Boddaert is so well known and has stood for our eastern deer so long that it seems like sacrilege to change it, but it is antedated by seven years by Erxleben's name *Cervus dama americana.* Erxleben proposed this name on page 312 of his Syst. Regni Animalis, Mammalia, 1777. In a separate paragraph at the end of his article on *Cervus dama* he asks if *americanus* is different, as supposed by Pennant (Differtne vere *americanus* vti Pennanto videtur?). He quotes a part of Pennant's description and gives synonomy, so that the name will have to stand. He gives its distribution as Virginia and Carolina."

† The type and other specimens collected will be placed, as soon as possible, in the collection of the U. S. National Museum, at Washington, D. C.

Color.—In the type, which is in complete winter coat, the upper surface is superficially a pepper-and-salt mixture of black, yellowish white, and gray. A distinctly blackish area begins anteriorly on the crown, between the horns and ears, and extends posteriorly almost to the root of the tail. The color gradually pales to light yellowish ash on the sides. All of the hairs of the upper surface are white at extreme base, plumbeous ash in the middle, black apically, and subterminally ringed with yellowish white, these whitish annuli increasing in width from the vertebral area downwards. Under surface pure white on the axillæ, inner surface of thighs, and abdomen; fuliginous on the chest. Tail white below, black above, the black of the upper surface much obscured by broad yellowish brown subterminal annuli to the hairs. Head, with naked nose-pad, and front of under lip, plumbeous-black. Iris yellowish hazel. Upper jaw white anteriorly, next to the naked muffle, becoming light ash further back, with an intervening area of black, which latter forms a triangular area, with its base applied to the posterior margin of the nostril and its apex crossing the middle of the upper lip and extending over the under jaw to form a small black spot behind the pure white chin. Throat white, mixed with ash where the basal coloring of the hair is exposed, between the white tips. Upper side of head black, much obscured on the forehead by dirty white and reddish subterminal annuli. Orbits and base of ear externally whitish. Concavity of ear densely clothed with long white hair; convexity tipped and bordered by black, except at base anteriorly, the black enclosing an area of pepper-and-salt gray; base of ear posteriorly clear ash-gray. Sides of head ash-gray, thickly annulated with whitish. Brows and bristles about eyes all black; those about muzzle black and white. Limbs reddish fawn, more or less mixed with gray and black anteriorly, whitish or pale fawn color posteriorly, and white around hoofs and between toes. Hoofs plumbeous, horn color where worn off at apex. The metatarsal gland, which measures 15 mm. in length, is surrounded by a tuft of reversed hair, which is white in the middle, bordered by dark brown.

A young male, an old female, and a young female (Nos. 4289, 4290, and 4291, author's collection) killed with the type December 25, 1897, and also in full winter pelage, agree essentially in coloration with the adult male described above, except that the ears and crown of head are blacker, and the light annulations on the upper side of the tail nearly or quite wanting, leaving that part clear black.

The summer coat, as usual, is reddish.

Horns.—The horns of the type approach those of the Sonoran deer, *Dorcelaphus couesi* (Coues and Yarrow), in size and form. There are two basal snags, one directed upward and backward (length 75 mm.), and one forward (length 37 mm.), with four additional points to each horn, making twelve points in all. The length of the beam, measured to end of anterior point, following the curves of the horn, is 440 mm. The horns are symmetrical, their longest points measuring 175 mm. in height. The beam is strongly curved upward, forward, and inward, the tips of the anterior tines approaching within 70 mm. of each other. The total expanse of the horns is 330 mm.; the circumference of beam, at base, 80 mm.

Measurements of type.—Length, measured from end of muzzle to end of last caudal vertebra, 1585 mm.; tail vertebræ, 265 (to end of hairs 345); ear from crown, 160; ear from base of opening, 140; girth of chest, 800; from tip of nose to angle of mouth, 90; to eye, 152; to center of pupil, 170; to base of ear, 225; to base of horn, 220; to occiput, 280; diameter of eye, 26; fore limb, from coracoid process of scapula to end of hoof, 700; from olecranon, 575; length of manus, 325; hind limb, from knee-joint to end of hoof, 625; length of pes, 430; height of animal at shoulder, 880; height at hips, 900; from great trochanter to coracoid, 710.

Cranial and dental characters.—The skull is narrow, with elongate nasals. That of the type, an old male in which the permanent premolars are considerably worn, presents the following measurements: basilar length (basion to front of premaxillary), 244 mm.; zygomatic breadth (across middle of orbits), 114; occipito-nasal length, 208; least interorbital breadth, 71; greatest length of nasals, 81; greatest breadth of nasals, 31; least breadth of nasals, 18.5; greatest diameter of orbit, 38; length of upper lateral tooth-row, 24. The skull of an old female (No. 4290, author's collection) presents these dimensions: basilar length, 241 mm.; zygomatic breadth, 96; greatest length of nasals, 81; greatest breadth of nasals, 26; greatest diameter of orbit, 35. In the type specimen the nasal and premaxillary bones are separated by a space of 10 mm., which is occupied by a forward arm of the maxillary. In a young male (No. 4289, author's collection), having three points and a basal snag to each horn, the nasal and premaxillary bones barely meet. In an old female (No. 4290, author's collection) and a yearling female (No. 4291, author's collection), the premaxillaries articulate broadly with the nasals.

Remarks.—Numerous skins of this deer from Texas, and Mexico south to San Luis Potosi, have been examined and found to agree in size and coloration with those above described. The horns vary within ordinary limits; but those of the type represent the usual size and form, except that there is more often but one basal snag. The bucks weigh in the neighborhood of 100 pounds, and the does about 75 pounds.

While the Texan deer differs sufficiently from the white-tailed deer of southern Mexico and Central America, as well as from the forms recognized in the United States, to warrant its separation, the available material is insufficient to furnish a reliable indication as to its intergradation with them. Therefore, for the present, it is proper to regard it as a species.

Comparisons.—The type locality of *Dorcelaphus americanus* (Erxleben) was given as Virginia and Carolina. Compared with specimens from that general region, *D. texanus* is found to differ in being much smaller and paler, with actually as well as relatively heavier dentition. Between the ranges of these two, a very different form is interposed in the lowlands of Louisiana.

The Floridan deer, *Dorcelaphus osceola* (Bangs) is even darker in color than *D. americanus*. Compared with the present form, it is larger, with relatively longer limbs, larger horns, smaller teeth, and more elongate rostrum.

Dorcelaphus macrourus (Rafinesque) is a large pallid form of the northern plains region, characterized by restriction of the dark, and corresponding expansion of the light areas. It has widely branching, often scraggy horns, very different from those of *D. texanus.*

The only remaining deer of the United States requiring comparison with the small Texan species is the Sonoran deer, *Dorcelaphus couesi* (Coues and Yarrow), a still smaller and more pallid animal, having much larger ears, on which the black edging and tips were wanting. The dentition of *D. texanus* is much heavier, and the tail considerably shorter, than in *D. couesi.*

The only Mexican deer with which the present form requires comparison is the animal that has been known by the specific name *mexicanus.* This name was first applied by Gmelin.* According to Dr J. A. Allen,† "the *Cervus mexicanus* of Gmelin, however, is a vague composite species, only in part referable to Deer from Mexico, and in all probability has no relation to the little Sonoran Deer described by Baird."‡ The name *mexicanus* may, however, be regarded as fixed to a deer of southern Mexico, very different from the Texan deer, by Lichtenstein, who described and figured the species § from specimens sent alive to Berlin, in 1825, by Herr Graf, from 'Mexico,' without indication of the exact locality at which they were taken.

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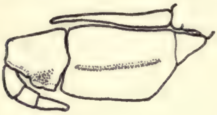
* Syst. Nat., I, 1788, p. 179.

† Bull. Am. Mus. Nat. Hist., VII, June 29, 1895, p. 200.

‡ Rept. Pacific R. R. Expl. and Surveys, VIII, Mammals, 1857, pp. 653–655, pl. XXIV, fig. 2.

§ Darstellung, 1827–'34, pl. XVIII.



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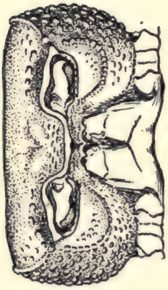

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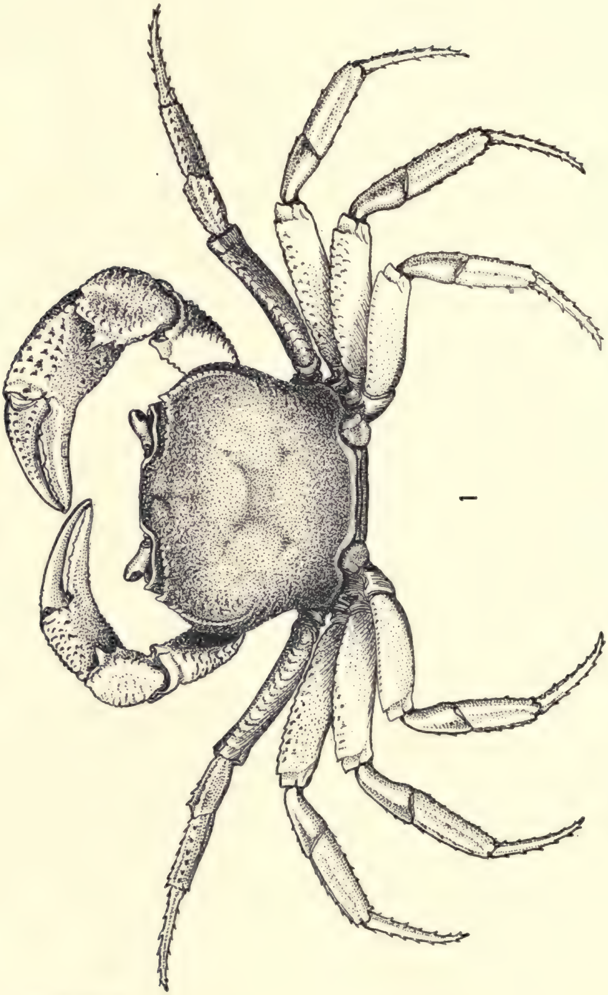

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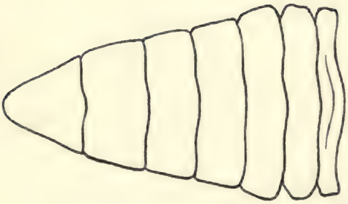

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Potamon abbotti Rathbun.

VOL. XII, PP. 27-30 JANUARY 27, 1898

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

DESCRIPTIONS OF THREE NEW SPECIES OF FRESH-WATER CRABS OF THE GENUS *POTAMON*.*

BY MARY J. RATHBUN,

Of the three species here described, one is a typical *Potamon*, in which the postfrontal crest is developed but interrupted; the other two belong to the subgenus *Geothelphusa*, without a postfrontal crest. The first, *P. abbotti*, is from the Malayan Peninsula, and is related to a group of Indian species described by Wood-Mason. The second, *P.* (*Geothelphusa*) *levicervix*, was taken at the Loo Choo Islands with *P.* (*G.*) *dehaanii* (White) and *P.* (*G.*) *obtusipes* (Stimpson), by a Japanese collector, Mr. F. Sakamoto, and forwarded to the U. S. National Museum by Mr. Garrett Droppers. The third species, *P.* (*G.*) *macropus*, is notable as being the first member of the subgenus taken on the west coast of Africa. The other African species of *Geothelphusa* are *Potamon* (*Geothelphusa*) *berardi* (Savigny) from Egypt, *P.* (*G.*) *socotrensis* (Hilgendorf) from Socotra, and *P.* (*G.*) *emini* (Hilgendorf) from Victoria Nyanza. This last has faint indications of a crest, but so also has *P. dehaanii* (White), which is one of the two original species of *Geothelphusa*. On account of the presence of this feeble crest in *P. dehaanii*, it were better to consider *P. obtusipes* (Stimpson) as the type of the subgenus *Geothelphusa*.

Potamon abbotti sp. nov.

Pl. I.

Cervical suture obsolete; subbranchial regions distended laterally; merus of maxillipeds as long as wide.

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* Published by permission of the Secretary of the Smithsonian Institution.

Carapace rather narrow, about four-fifths as long as broad, very convex in an antero-posterior direction, nearly level transversely in the widest part. Surface granulate and punctate, anterior and antero-lateral portions tuberculate or rugose. Cervical suture obsolete, except its posterior third. Postfrontal crest interrupted, tuberculate. Protogastric lobes oval, depressed, in advance of the remainder of the postfrontal crest and separated from it by a sulcus behind the inner angle of the orbit; the outer portion of the crest is concave forward and subparallel to the orbital margin, and terminates laterally in an acute epibranchial tooth, 2 mm. behind the orbital tooth. Behind the epibranchial tooth there is a raised tuberculate and convex margin extending half-way back on the carapace. The carapace is swollen laterally outside of and beneath this margin. Front (fig. 2) about one-fourth the entire width of the carapace; lower margin straight, sides oblique. The median suture is not continued in front of the protogastric lobes. Frontal and orbital margins strongly rimmed. Superior orbital margin sinuous; outer tooth broad, acute, separated from the crenulated inferior margin by a deep rounded sinus. Subbranchial regions crossed obliquely by short tuberculated rugæ which extend up to the postero-lateral margins. Suborbital region sparsely tuberculated on its posterior half.

The sides of the penultimate segment of the abdomen of the male are convex; terminal segment with slightly sinuous margins (fig 3).

Maxillipeds (fig. 4) with merus as long as wide, outer margins oblique, converging anteriorly. Chelipeds unequal in both sexes, very rough. Outer surface of merus rugose; margins with blunt teeth. Carpus rugose, a very strong inner tooth with denticles beneath . Hands very rough on the outer side, less so on the inner side. Fingers bent down, those of larger hand gaping a little at base. Ambulatory legs long and narrow.

Dimensions.—Male, length 35.5 mm., width 44, width between margins 41.5, inferior width of front 10.4; female, length 30 mm., width 37.5, width between margins 36, inferior width of front 9.5 mm.

Type locality.—Trong, Malay Peninsula; Dr. W. L. Abbott, 1896; one male, three females (U. S. Nat Mus. No. 20641).

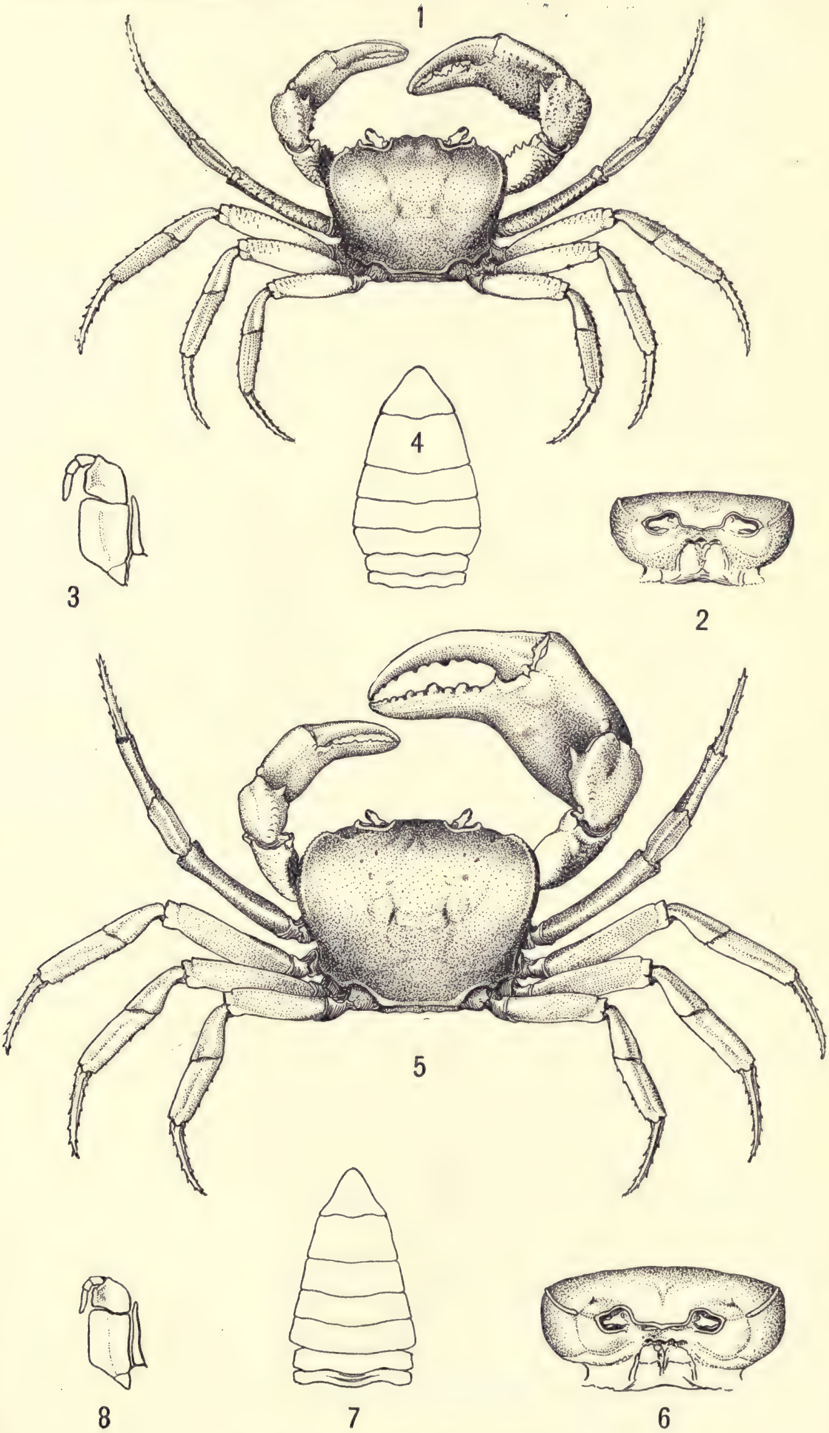
This species approaches nearest to *P. pealianus* (Wood-Mason) of Sibsaugor, Assam, but is separated from it by a number of prominent characters, viz., obliteration of cervical suture, swollen subbranchial area, elongate merus of the maxillipeds, slenderer legs, and narrower carapace.

Potamon (Geothelphusa) levicervix sp. nov.

Pl. II, figs. 5–8.

Postfrontal crest and cervical suture obsolete; epibranchial tooth blunt; legs long and narrow.

Carapace about three-fourths as long as broad, thick, very convex in a longitudinal direction, and less convex although distinctly and regularly so in a transverse direction. Surface smooth and punctate, with a few larger depressions on the anterior half. Cervical suture obsolete. Branchio-cardiac depressions deep. Postfrontal crest absent; protogastric lobes in-



FIGS. 1–4. *Potamon macropus* Rathbun.
5–8. *Potamon levicervix* Rathbun.

dicated only by depressions in front of their normal position. Epibranchial tooth 7 mm. from the orbit, very broad, obtuse, its outer margin a curve continuous with the curve from the tooth to the orbit, tooth bounded anteriorly by a broad notch. Equidistant from this notch and from the orbital angle and directly behind the latter is a deep transverse and somewhat triangular depression.

Antero-lateral margin tuberculate; subbranchial region visible outside the margin as a narrow rim. Front about one-fourth the width of the carapace, margin nearly straight and not visible in a dorsal view; the median suture does not extend to the margin. Orbits oblique in a front view (fig. 6), superior margin sinuous, directed outward and forward in a dorsal view, outer angle prominent, acute. Inferior regions of the carapace smooth, punctate; subcervical groove very deep. In the abdomen of the male (fig. 7) the sides of the sixth segment are oblique, of the seventh sinuous. The merus of the outer maxilliped is broad, with regularly rounded antero-lateral outline (fig. 8).

Chelipeds very unequal. Merus with outer surface and upper and outer margins somewhat rugose; inner and lower surfaces and inner margin smooth. Carpus slightly roughened, with a stout, triangular, blunt inner tooth, below which is a low swelling; anterior half marked by an irregular longitudinal depression. Larger hand very wide and thick, slightly rough, the raised lines forming reticulating lines which are punctate, the punctæ connected by minute impressed lines; space enclosed by the lines of a darker color; fingers long; pollex bent at an angle of 45° with the palm; fingers gaping to the tips. Smaller hand punctate, almost smooth and without conspicuous color marks; fingers slightly bent and little gaping. Ambulatory legs very long; surface slightly rough; merus joints with entire margins; carpal joints with a few spinules at the distal extremity; propodal joints with upper margins spinulous in the first and fourth pairs, distal and lower margins more or less spinulous in all.

Dimensions.—Male, length 48.5 mm., width 63.3, width between margins 61.5, width of front below 14.2.

Type locality.—Loo Choo Islands; F. Sakamoto; one male (U. S. Nat. Mus. No. 20642).

This species comes nearest to *P.* (*G.*) *transversus* von Martens, but is so different that they cannot be confused. The form of the abdomen and legs alone sufficiently differentiates them.

Potamon (Geothelphusa) macropus sp. nov.

Pl. II, figs. 1–4.

Postfrontal crest obsolete; cervical suture present; epibranchial tooth acute; ambulatory legs long and narrow.

Carapace very convex antero-posteriorly, slightly so transversely; about one-third broader than long; branchial regions much swollen laterally; posterior width greater than exorbital width. The surface is very finely granulate, and covered with small punctæ visible to the naked eye. The sutures of the carapace are shallow and the surface along their boundaries is drawn in fine wrinkles. The cervical suture if continued would cross the orbital margin at its middle. The protogastric lobes are small but prominent. The front is about one-fourth the width of the carapace, deflexed, deepest in the middle, margin sinuous. The orbits are inclined obliquely downward and outward (fig. 2); superior margin sinuous and directed forward and outward, terminating at the outer angle in a prominent acute tooth. Margin of front and superior margin of orbit strongly rimmed. Inferior margin of orbit crenulate. Epibranchial tooth small, tuberculate, situated as far from the tip of the orbital tooth as half the width of the orbit; and succeeded on the lateral margin by small irregular tubercles for about half the length of the branchial region. Subbranchial region visible laterally outside the branchial margin and covered with short oblique granulated ridges. Suborbital area comparatively smooth, but with fine scattered granules; jugal area coarsely tuberculate.

The ischium of the outer maxillipeds (fig. 3) has a deep median furrow and large punctæ; merus rougher, slightly longer than wide, and its antero-lateral margin is obtusely rounded. The sixth abdominal segment of the male (fig. 4) is longer than the seventh and its proximal margin is convex, so that the fifth segment is longer laterally than in the middle.

Chelipeds very unequal. Meri elongate; margins armed with strong teeth; lower surface near antero-distal angle furnished with a stout downward-projecting tooth. The carpi are covered with granulated rugæ and the inner margin is spinous, the distal spine much the larger; outer inferior angle with a downward-pointing tooth. The propodi are covered with minute scabrous granules, among which are scattered larger granules set in punctæ; inner surface rougher than the outer. Pollex bent down. Both fingers deeply grooved; prehensile edges armed with very irregular blunt teeth; little gaping, the projections of the one finger in general fitting into the cavities of the other.

Ambulatory legs very long; meral joints compressed, upper margins spinulous; both margins of the propodal joints spinulous.

Dimensions.—Length 23.5, width 32, exorbital width 20.2, posterior width 23.2, width of front 8.8 mm.

Type locality.—Mouth of Mesurado River, Monrovia; O. F. Cook; one male (U. S. Nat. Mus. No. 20643).

EXPLANATION OF PLATES.

PL. I. Potamon abbotti.

Fig. 1. Dorsal view, × ⅘. 2. Front view, × ⅘.
3. Abdomen of male, × 1⅗. 4. Outer maxilliped, × 1⅗.

PL. II. Potamon macropus and levicervix.

Fig. 1. P. macropus, dorsal view, × ¾. 2. Front view, × ¾.
3. Outer maxilliped, × 1½. 4. Abdomen of male, × 1½.
5. P. levicervix, dorsal view, × ½. 6. Front view, × ½.
7. Abdomen of male, × ¾. 8. Outer maxilliped, × ¾.

Vol. XII, pp. 31-33 March 24, 1898

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

DESCRIPTIONS OF TWO NEW SKUNKS OF THE GENUS *MEPHITIS*.

BY OUTRAM BANGS.

Mephitis spissigrada sp. nov.

Type from Sumas, B. C. No. 3699, ♀ adult, coll. of E. A. and O. Bangs. Collected September 30, 1895, by Allan C. Brooks.

General characters.—Externally, with much the general appearance of *M. hudsonica* and *M. occidentalis*, large size and long tail, peculiar to all the skunks of this group. Heel densely hairy; skull differing from that of either *M. hudsonica* or *M. occidentalis* in having a very short palate, the end falling at or forward of a line across posterior alveoli of last upper molars; palate ending in an even curve (like that of *M. hudsonica* and *M. mephitica mephitica*) without reëntrant notch (as in *M. occidentalis*) or median spine (as in *M. mephitica scrutator* and *M. elongata*).

Color.—As usual in the *hudsonica* group. Black all over, with white frontal stripe, nuchal patch, and lateral stripes extending from nuchal patch to and down sides of tail; the long white hairs of sides of tail overlie the shorter hairs and fall to the end of the blunt brush-like terminus of the tail.

Measurements.

	Total length.	Tail vert.	Hind foot.
No. 3699, type, ♀ adult..................	640	240	75
No. 3700, topotype, ♀ adult..............	610	230	75
No. 5548, topotype, ♂ old adult..........	...	270	85

Skull.—Type, ♀ ad. Basal length 68; occipito nasal length 69.6; zygomatic breadth 49.6; mastoid breadth 41; greatest length of single half of mandible 50.

Cranial characters.—Skull similar to that of *M. hudsonica* and *M. occidentalis*, but differing from both these in being shorter and broader and having shorter rostral region and shorter palate, the end of palate falling at or anterior to a line drawn across posterior alveoli of last upper molars (in *M. hudsonica* and *M. occidentalis* the end of the palate falls well behind such a line). From *M. occidentalis* it differs still farther in having larger, rounder audital bullæ and the palate ending in an even curve (*M. occidentalis* having a reëntrant median notch), and from *M. hudsonica* in having much shorter, broader rostrum, wider nasals, and wider, flatter frontals.

Remarks.—Mr. Allan C. Brooks has sent me three skins and skulls and one extra skull (♂ old ad.) of this form, all collected by himself at Sumas, British Columbia. The species belongs to the very distinct *hudsonica* group, but seems different enough from either *hudsonica* or *occidentalis* to merit separation, though it may intergrade with both of them.

Mephitis avia sp. nov.

Type from San Jose, Illinois, No. 5747, ♂ adult, coll. of E. A. & O. Bangs. Collected March 10, 1897; skinned, measured, and sexed by H. H. & C. S. Brimley.

General characters.—Size rather small; tail very short; foot of medium length; heel clothed with long hairs along the sides, a narrow medial strip naked; colors as usual. Skull peculiar.

Color.—Black all over, except white frontal stripe, nuchal patch, and two lateral stripes extending back from nuchal patch. Tail very short and bushy, black externally, most of the hairs white at base.

Measurements.

	Total length.	Tail vert.	Hind foot.
No. 5747, type, ♂ adult..................	675	190	65
No. 5783, topotype, ♂ adult..	607	177	65

Skull.—The type ♂ adult. Basal length, 62; occipito nasal length 65; zygomatic breadth 44.6; mastoid breadth 35.4; greatest length of single half of mandible 46.4.

Cranial characters.—Skull short and heavy; highly arched in frontal region; palate broad at end and without median spine; zygoma broadly expanded at posterior end, then slanting abruptly forward (very different in shape from the more even curve seen in *M. mephiticr*, *M. scrutatoo*, etc.); mastoid and paroccipital processes very much reduced; mastoid bullæ very large and much inflated; (these two last characters give this part of the skull somewhat the appearance of the skull of *Spilogale.*) Sagittal crest high; dentition normal, with the exception of upper carnassial tooth, which is unusually large.

Remarks.—Mephitis avia needs comparison with but one form, its nearest geographical ally, *M. mephitica scrutator*. It differs very much from that form in many ways. The short tail, the broad palate without median spine, the large much inflated mastoid bullæ, and peculiarly shaped zygoma distinguishing it.

I have a fine adult female skunk from Denver, Indiana, that is in every way exactly like examples of *M. mephitcia scrutator* from Massachusetts and Connecticut. So that it is probable that the range of *M. avia* does not extend very far to the east of the type locality. Undoubtedly it is the form of the central prairie region, being replaced in the north by *M. hudsonica* and in the east by *M. mephitica scrutator.*

Scrutator apparently reaches the height of differentiation in Louisiana. The series of skunks from Cartville and Point aux Loups Springs, Acadia Parish, Louisiana, from which I selected the type of *M. mephitica scrutator*, shows about the proportion of tail to total length found in specimens from the central Atlantic States. They are smaller, however, than examples from Massachusetts and Connecticut, and have smaller, lighter skulls and weaker dentition. Although they do not approach very nearly the larger, shorter-tailed *M. avia* with its heavy peculiar skull, still it is possible that intergradation may take place somewhere.

VOL. XII, PP. 35-38 MARCH 24, 1898

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

DESCRIPTIONS OF THE NEWFOUNDLAND OTTER AND RED FOX.

BY OUTRAM BANGS.

The following descriptions of the otter and the red fox of Newfoundland are based on material collected by Ernest Doane, now in the Bangs collection. Of the otter, he has sent a fine pair of adult skins with skulls, and two extra skulls; of the fox, six skins with skulls, and nine extra skulls. In addition to these I have examined a large series of unsexed otter skulls from Newfoundland in the Museum of Comparative Zoology at Cambridge.

Lutra degener sp. nov.

Type from Bay St. George, Newfoundland, No. 6965, ♂ young adult, Coll. of E. A. & O. Bangs. Collected April 23, 1897, by Ernest Doane.

General characters.—Size small, tail short, skull small and weak, with very light zygoma and narrow frontal and rostral regions.

Color.—Deep, lustrous seal brown to black all over, except cheeks, upper lips, chin, and under side of neck, which are grizzled brown, palest on cheeks; under fur light grayish brown at base and gradually darkening to deep rich brown at tips.

Cranial characters.—Skull as compared with that of *L. hudsonica* small and weak; whole frontal and rostral region narrow; postorbital processes long and slender; distance from last upper molar tooth to end of pterygoid process short; zygoma short and very slender; audital bullæ small; dentition normal.

Measurements.—♂ young adult (type); total length 998; tail vertebræ 358; hind foot 126. ♀ old adult, (topotype) No. 6966. Total length 990; tail vertebræ 352; hind foot 109.

Skull, ♂ young adult, (type); basal length 94.6; zygomatic breadth 66.8; mastoid breadth 60; interorbital constriction 22.2; greatest constriction behind postorbital processes 18.8; distance across postorbital process 32.4; last upper molar to end of pterygoid process 26; foramen magnum to end of palate 46.4; greatest length of single half of mandible 63.2.

♀ old adult (topotype) No. 6966; basal length 95.4; zygomatic breadth 70; mastoid breadth 63; interorbital constriction 22.8; greatest constriction behind postorbital processes 19.4; distance across postorbital process 33.6; last upper molar to end of pterygoid process 26.8; foramen magnum to end of palate 46.6; greatest length of single half of mandible 65.8.

Remarks.—The characters that separate *Lutra hudsonica* and *Lutra degener* are constant and well marked so far as my series goes. I have fine skins and skulls of *L. hudsonica* from Nova Scotia, New Brunswick, Maine, Massachusetts, and Connecticut, but unfortunately have seen but one skull, an imperfect one, from Labrador, though otter are common there.

I believe the Newfoundland otter is an island species, though I cannot be sure of this; possibly it occurs also in Labrador, as otter might easily swim the distance that separates Newfoundland from the continent if they so chose.

Henry Reeks, however, says of the Newfoundland otter:* "Both traders and settlers make two varieties or species (?) of the Newfoundland otters: one, which is called the 'country otter,' and principally frequents inland brooks and rivers, has the fur of a beautiful shining dark liver-brown, almost black on the back, while the other variety, called the 'salt-water' otter, *is said* (for I was unfortunate in not getting a specimen) to have the fur of a rusty brown color and to be considerably larger than the 'country otter,' although the skin is not nearly so valuable, rarely realizing more than three or four dollars, whereas good skins of the smaller and darker variety fetch from five to seven dollars."

Perhaps the 'salt-water' otter may be true *L. hudsonica* that occasionally visits the shores of Newfoundland and does not intermingle with the resident form there, *L. degener*.

Vulpes deletrix sp. nov.

Type from Bay St. George, Newfoundland. No. 6967, ♀ middle-aged adult, coll. of E. A. and O. Bangs. Collected April 24, 1897, by Ernest Doane.

General characters.—Size rather small; tail short; hind foot very large; feet and hands densely hairy beneath and armed with extremely long and stout claws; ears large, very woolly, and rounder than the ears of *V. pennsylvanica.* Color very variable; in 'red phase' pale ocher yellow (like the prairie fox). Skull but slightly different from that of *V. pennsylvanica;* dentition very strong, the carnassial tooth in particular being very large.

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* Zoölogist, March, 1870, page 2037.

*Color.**—Type in 'red phase.' Pelage extremely long and loose. Upper parts pale ocher yellow, to straw color, becoming darker and more rusty on inside of flanks, about shoulder, and on sides of face. Under parts dull white, including a narrow border to upper lip, the color of the upper parts extending down over sides and nearly meeting across middle of belly; chin dull brown; feet and hands black above as far as ankles and wrists, dull brownish yellow below, and densely haired with long loose hair, entirely obscuring the pads.

Tail short, pale, dull yellow with white tip, and irregularly overlaid in places with black tipped hairs; ears large and more rounded than in *V. pennsylvanica*, very thickly covered with woolly hairs, dull black above, yellowish white inside, and yellow at base. Under fur dull yellowish gray at base and yellow at tips, darker on flanks, rump, and under side of neck, and paler on back, shoulders, and belly.

No. 1178, ♀ very old; is a fine silver gray, being black all over except the back, which is beautifully variegated with silvery hairs. No. 6969, ♀ young adult, is a patch fox, being dark reddish brown all over, including tail, legs, and arms, except sides, top of head, parts of middle of back, and base of tail, where it has some yellow hairs intermixed. No. 6968, old nursing ♀, is about intermediate in color between the type and No. 6969, but has base of tail, inside of flanks, and region about fore shoulders a bright orange ochraceous. It is in worn pelage, with much of the long hair gone. A young, about one-third grown, No. 1180, is uniform deep black all over, tip of tail white, and a young, about one-half grown, No. 1179, is dull brownish ferruginous, with much black on legs, arms, tail, and under parts.

Cranial characters.—The skull differs but little from that of typical *Vulpes pennsylvanica*, except in being slightly wider and heavier and in having the whole rostral portion rather heavier and the audital bullæ constantly though slightly larger. The dentition is very much heavier throughout, the carnassial teeth in particular being very large and strong.

Measurements.—Type, ♀ middle-aged adult. Total length 959; tail vertebræ 336; hind foot 161; ear from notch 79. Average of four adult females: total length 958.5; tail vertebræ 342.5; hind foot 158; ear from notch 78.

Skull.—Type, ♀ middle-aged adult. Basal length 123.4; zygomatic breadth 72; mastoid breadth 47; least interorbital width 26.2; greatest length of single half of mandible 99.8. No. 6968, ♀ old adult topotype. Basal length 123; zygomatic breadth 72.8; mastoid breadth 46; least interorbital width 26.6; greatest length of single half of mandible 99.6. ♂ young adult topotype. Basal length 127.2; zygomatic breadth 70.2; mastoid breadth 46; least interorbital width 26; greatest length of single half of mandible 101.4.

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*All red foxes are somewhat brighter and more ferruginous in their fresh autumnal coats than they are in the spring. The hairs seem to become rather lighter and more yellowish as the tips wear off. This difference is slight, however, and even in full autumnal pelage the 'red phase' of the Newfoundland fox must be very pale.

Remarks.—The Newfoundland fox is easily distinguished from either typical *V. pennsylvanica* or *V. pennsylvanica rubricosa* by its very large hind foot, with long strong toes and tremendous claws. No. 1178, a very old ♀, taken June 9, 1894, at Codroy, is in worn summer pelage, and the long hairs on the under sides of the feet have worn down so that one pad on each foot can be seen. The long toes and heavy long claws are brought into great prominence, and make indeed a singular foot for a fox. As regards size and proportions, it needs no comparison with either *V. pennsylvanica* or the large, long-tailed, dark red form of Nova Scotia, *V. pennsylvanicus rubricosa.*

In color, the type and only specimen I have in the red phase (which I suppose to be normal) nearly matches many skins of the light yellow fox* of the northern prairies, from which form *V. deletrix* can be distinguished by much shorter tail, smaller size, proportionately larger foot, and heavy claws.

Vulpes deletrix is probably an island form, although there are occasionally times when it might cross from the mainland of Labrador to Newfoundland, or *vice versa*, on the ice; and as foxes do not hesitate to travel such distances on the open ice, it would not be surprising to find this form existing also in Labrador.

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* Whether the yellow fox of the northern and central prairies is identical with *Vulpes macroura*, which Baird originally described from a specimen from Great Salt Lake, Utah, is doubtful, although Baird himself, in 1857, included many specimens of the yellow form from Nebraska, Oregon, and Wyoming under that specific name. *Vulpes macroura* has also been applied to the yellow prairie fox by both Dr. Allen and Dr. Merriam, when either has had occasion recently to mention this animal.

Vol. XII, pp. 39-40 March 24, 1898

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

DESCRIPTION OF A NEW PARASITIC ISOPOD OF THE GENUS *ÆGA* FROM THE SOUTHERN COAST OF THE UNITED STATES.*

BY HARRIET RICHARDSON.

Two specimens of a species of *Æga*, heretofore undescribed, were obtained by the U. S. Fish Commission steamer 'Albatross' during its cruises in 1885 and 1886—one off Little Bahama Bank and the other between the delta of the Mississippi and Cedar Keys, Florida. They present no unusual characters, but differ from any of the known species of *Æga*.

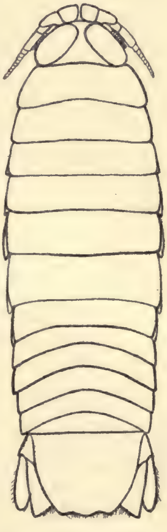

Fig. 1.—*Æga ecarinata* ($\times 2\frac{5}{7}$).

Æga ecarinata sp. nov.

Body elongate and narrow. Length more than three times greater than breadth. Surface punctate. Frontal margin of head bisinuated, the acumen separating the first pair of antennæ. Eyes large and oblong and situated at a small distance apart. First pair of antennæ extending almost to the flagellum of the second pair of antennæ; the first two joints of peduncle very broad; second joint extending anteriorly over the third joint, reaching almost to the extremity of that joint; third joint two-thirds narrower than first and second; the flagellum containing nine articles. Second pair of antennæ extending to the middle of the first thoracic segment; flagellum containing ten articles.

Epimera of all the thoracic segments narrow, the first two being rounded, the other four more acute at their extremities. First two pairs of prehensile legs rather stout; third pair less so, and the propodus of this pair is furnished with a large cultriform process. Five spines are present on the merus of all three pairs. Gressorial legs slender and sparsely spinulose.

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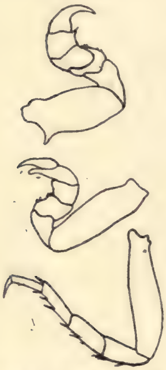

Fig. 2.—*Æga ecarinata* $(\times 5\frac{3}{7})$.

a. Leg of 1st pair.
b. Leg of 3d pair.
c. Leg of 7th pair.

All the abdominal segments are visible in a dorsal view. Terminal segment broad and posteriorly bisinuated, forming three teeth with rounded extremities; its surface entirely smooth.

Outer branch of uropods narrower and somewhat shorter than the inner branch; its extremity is rounded. Inner branch obliquely truncate and crenulate on posterior margin. Uropods and terminal abdominal segment all fringed with a few hairs.

Two individuals of this species were found—one between the delta of the Mississippi and Cedar Keys, Florida, Station 2403, depth 88 fathoms; the other, the type (No. 21001, U. S. Nat. Mus.), off Little Bahama Bank, Station 2655, depth 338 fathoms.

This species is closely related to *A. tridens*[*] Leach, but presents many specific differences: in the relative length and breadth of the body, the length being more than three times greater than the breadth in *A. ecarinata*, while in *A. tridens* Leach the length is only two and one-half times greater than the breadth; in the number of joints in the 1st and 2d pairs of antennæ, ten in the 1st pair and nineteen in the 2d pair being characteristic of *A. tridens* Leach, nine in the 1st and ten in the 2d pair being true of our species; in the presence of a cultriform process on the propodus of the third pair of prehensile legs, which process is entirely wanting in *A. tridens* Leach; and in the perfectly smooth surface in the present species of the terminal segment of the abdomen, which in the other species is tricarinated.

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[*] For synonymy, see Naturhistorisk Tidsskrift, vol. XII, 1879–'80, Schiœdte & Meinert, 'Symbolæ ad Monographium Cymothoarum, Crustaceorum Isopodum Familiæ,' p. 340–341.

VOL. XII, PP. 41-51 MARCH 24, 1898

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

THE ARCTURIDÆ IN THE U. S. NATIONAL MUSEUM.*

BY JAMES E. BENEDICT,

Assistant Curator, Division of Marine Invertebrates, U. S. National Museum.

When Mr. Beddard wrote the Report on the Isopoda collected by the 'Challenger' in 1886, but five species of *Arcturus* had been recognized. He added thirteen. Since his report no additional species have been described. In this paper five species taken by the 'Albatross' and one by the Point Barrow Expedition are described as new and a subspecies is raised to specific rank.

The structure and habits of the Arcturidæ are such that deep-water species are likely to occupy only restricted areas. The young are few in a brood and are cared for by the parent until well able to care for themselves, clinging to the mother's antennæ until ready to undertake a more independent existence, perhaps on the very object on which the mother is foraging for herself and brood. With habits of this kind the chances of a wide distribution for any one species must be very much less than is the case where free-swimming young are produced in large numbers.

The character of the marsupium of *Arcturus* is sufficient to separate this genus from *Astacilla*. The dactyls of some species of *Arcturus* are biungulate as in *Astacilla*.

Two species of *Astacilla* are described as new, one from the Straits of Magellan and a blind species from deep water (1,825 fathoms) off Martha's Vineyard. The finding of a blind *Astacilla* in deep water is a matter of no little interest. Mr. Beddard truly says of deep-sea Isopoda:* "Although the number of deep-sea species which have well-developed eyes is so large, they nearly all (all except three) belong to the two allied genera *Arcturus* and *Astacilla*, which thus form almost the only exception to the general statement that deep-sea Isopoda are blind." Of *Astacilla* he says:† "Unlike *Arcturus*, *Astacilla* is almost exclusively an inhabitant of the shallow waters, only one species, indeed, *Astacilla granulata*, ranging into deep water."

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KEY TO THE SPECIES OF *Arcturus*.

- a. End of the abdomen notched, as seen from above.
  - b. Body smooth and free from spines .... *beringanus.*
  - b′. Body spiny.
    - c. Head and six segments of the thorax each with a pair of spines on the dorsum................. *longispinis.*
    - c′. Head and segments of the thorax with not less than two pairs of spines to the segment.
      - d. Second and third articles of the antennæ without spines except at the articulations ..... *hystrix.*
      - d′. Second and third articles of the antennæ with spines on the bodies of the articles.......... *murdochi.*
- a′. End of the abdomen without notch.
  - b. Thorax without spines above the epimera.
    - c. Abdomen acute or subacute at extremity.
      - d. Eyes elevated on peduncles.... .... *oculatus.*
      - d′. Eyes not elevated on peduncles.
        - e. Extremity of abdomen notched in a lateral view.
          - f. Thorax very tubercular............... *stebbingi.*
          - f′. Thorax not tubercular............... *abyssicola.*
        - e′. Extremity of abdomen without notch.
          - f. Fourth segment of the thorax much longer than the preceding segments. *glabrus.*
          - f′. Fourth segment of the thorax but little longer than the preceding segments.
            - g. Thorax with large swellings or tubercles..................... *tuberosus.*
            - g′. Thorax without tubercles....... *myops.*
    - c′. Abdomen rounded at extremity.
      - d. Abdomen notched at its extremity in lateral view .... *spinifrons.*
      - d′. Abdomen without notch at its extremity.
        - e. Epimeral spines present................. *anna.*
        - e′. Epimeral spines wanting.... .... *coppingeri.*

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* Report on the Isopoda collected by the 'Challenger,' p. 166.

† *Op. cit.*, p. 107.

- b′. Thorax with spines above the epimera.
  - c. Spines present in front of the ocular space.
    - d. Spines, spinules, or spiny tubercles very numerous on the thorax.
      - e. Spines all long and slender ....*multispinis.*
      - e′. Spines all short or with a few long ones.
        - f. All spines short.
          - g. Third segment of antennæ spinulose........................ *furcatus.*
          - g′. Third segment not spinulose.... *glacialis.*
        - f′. Spines long and short.
          - g. With three spines extending back from the abdomen............ *spinosus.*
          - g′. With two spines extending back from the abdomen.......... *americanus.*
    - d′. Spines of the thorax comparatively few.
      - e. Last segment of the abdomen with a carinate median line.
        - f. Second segment of abdomen with spines .... *cornutus.*
        - f′. Second segment without spines...... *tenuispinis.*
      - e′. Last segment without carina.
        - f. Abdomen armed with a long median spine which projects beyond the end of the segment.
          - g. Upper surface of abdomen smooth. *purpureus.*
          - g′. Upper surface spinulose .... *studeri.*
        - f′. Abdomen without median spine..... *brunneus.*
  - c′. Spines absent in front of the ocular space.
    - d. Head free from spines...................... *feildeni.*
    - d′. Head with spines present between the eyes.. *baffini.*

Arcturus baffini (Sabine).

Idothea baffini Sabine, Appendix to Parry's First Voyage, p. 50, pl. i, figs. 4–6, 1824.

Arcturus tuberculatus Latreille in Cuvier, Règne Animal, ed. 2, IV, p. 139, 1829.

Arcturus baffini Westwood, Trans. Entom. Soc. Lond., vol. I, p. 72, 1836.
Milne-Edwards, Hist. Nat. Crust., III, p. 123, pl. xxxi, fig. 1, 1840.
Sars, Crust. Norw. North Atlantic Expd., p. 97, pl. ix, figs. 1–21, 1885.
Beddard, Report on the Isopoda collected by the 'Challenger,' pl. xx, fig. 12, 1886.

The best figures of this species are, in my opinion, those of Professor Sars. It is the oldest and best known species of the genus, and has been taken over a larger range than any other. Its characters are so well marked that it can be readily separated from any other species in the collection.

Arcturus feildeni Miers.

Arcturus baffini var. *feildeni* Miers, Ann. and Mag. Nat. Hist. (4), XX, 64, 1877.

The head is a little broader than long when the length is measured on the side; the surface presents three areolations, two circular ones a little in front of the line of the eyes and a long transverse one behind the eyes.

The antennæ are equal to the body in length—36 mm.; the fourth and fifth joints are each 11 mm.

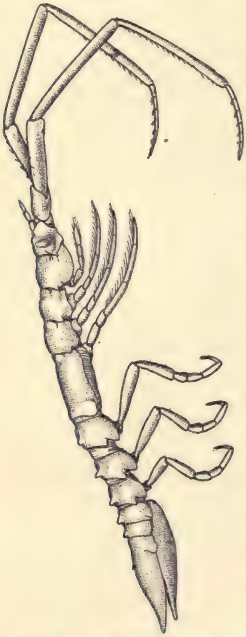

FIG. 3.—*Arcturus feildeni.* (× 1½.)

The four anterior segments of the thorax are without spines or tubercles; two slight areolations near the anterior border of the second and third segments do not correspond to the spines of *baffini*, as they exist on that species in addition to the spines. The fourth segment is equal in length to the two preceding. The three posterior segments of the thorax and the two anterior segments of the abdomen are each provided with a pair of small blunt spines.

The middle surface of the abdomen is without any indication of the prominent spiny projections of *baffini;* the median line, on the other hand, shows when dried a slight irregular median groove. The conical lateral projections of *baffini* are altogether wanting in this species. The epimera are also much modified in *feildeni;* they are much less pointed, and are directed downwards, making them inconspicuous from a dorsal view. The surface of the body is glabrous. The above description is based on a single specimen labeled 'Camp Clay, Cape Sabine; Lieut. [now General] A. W. Greely.' (No. 12416, U. S. N. M.) A much larger and less typical specimen is labeled '*Arcturus baffini* var. *tuberosus*, Davis Straits.' This is identical with the Cape Sabine specimen, except that the spines of the posterior segments are reduced to very low tubercles. The range of variation, as indicated by the two specimens, is easily within specific limits; both are far removed from *A. baffini.* Length of specimen from the front to the abdomen 50 mm. (No. 20333, U. S. N. M.).

Arcturus longispinis sp. nov.

This species, though well marked, partakes strongly of the characters of *baffini*, the type of the genus.

The head is deeply concave in front; the margin does not form a true curve, but shows slight projections between the median and outer antennæ. The eyes are triangular and conspicuously protruding. The basal joints of the median antennæ are oblong and flattened; the outer antennæ are 52 mm. in length; the first two joints are but little longer than broad, while the three distal joints are long; all are unarmed; the flagellum is composed of about 12 short segments.

The spines of the head and dorsal region are placed like those of *baffini;* with the exception of those on the posterior portion of the thorax, they are much longer than in any specimen of *baffini* that I have seen; the spines of the head are 6.5 mm. in length, while those of the second, third, and fourth segments are but little shorter. The spines on these segments are united at the base by a low ridge which curves up on the spines, giving them the appearance of parts of a single structure. Between the anterior spines and the epimeral projections on their respective segments are low protuberances; ridges also run from the bases of the spines along the margins to the posterior angle of the segments, leaving a deep transverse groove below the spine. The spines of the first thoracic segment are very small and inconspicuous; it is possible that this segment may not be normal in regard to the spines, as it is partially overgrown by a colony of Polyzoa.

The epimera of the second, third, and fourth segments increase in size posteriorly; they are flattened on the exposed surface and evenly rounded below; there is a depression on the exposed face. Viewed from above, the epimeral projections are covered by large rounded tubercles on the lower margins of the segments. The epimera of the fifth, sixth, and seventh segments decrease in size posteriorly, and are broad and wedge-shaped; the spines of these segments are the same in character as those of the anterior segments, but are much smaller, measuring on the fifth 3 mm., the sixth 2.3 mm., seventh 2 mm.

The first abdominal segment is very short, with two small spines above and two conical projections below; the second segment has two long spines above, pointed backward, and none below; the terminal segment has two spines pointing backward inserted at about the middle of the dorsal surface; at this point the segment is rapidly depressed to the terminal points; the lower margin has two pairs of triangular projections; *A. baffini* has but one pair.

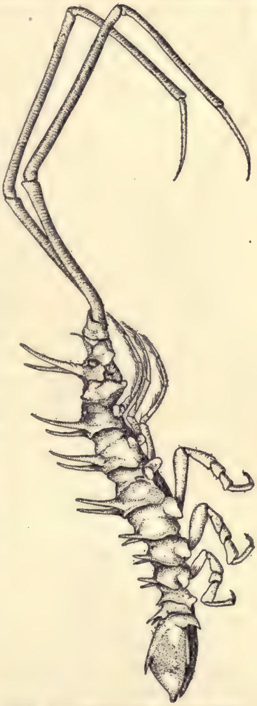

FIG. 4.—*Arcturus longispinis.* (× 1½.)

Station 3599, latitude 52° 05′ 00″ N., longitude 177° 40′ 00″ W., 55 fathoms. Type (No. 20530, U. S. N. M.).

Arcturus glabrus sp. nov.

The head is wider than long, measured in the constriction in front of the eyes and on the median line, but longer than wide if the side of the head is taken.

The antennæ are longer than the body in both sexes; much longer in the female than in the male.

There are no spines or tubercles on the head or posterior to it. The segments of the thorax and abdomen are smooth to the eye and are finely reticulated under a lens. The fourth segment differs in the sexes; in the male it is a little longer and more slender than the two preceding segments taken together; in the female it is shorter and stouter; so different is the appearance that the sexes can be readily separated in a dorsal view. The anterior margins of the second, third, and fourth segments are notched on the median line.

The abdomen is composed of two segments, anchylosed, the usual second segment being only indicated by a swelling above and a short suture at the side. There are no lateral projections on the abdomen; the epimera of the posterior part of the thorax cannot be seen from above. The dactyls of the posterior feet are biungulate. The length of the body of a male is 31 mm.; of the antennæ 38 mm.; female, body 28 mm.; antennæ 45 mm.; female, body 24 mm.; antennæ 39 mm.

A number of specimens of this species were taken by the 'Albatross' at Station 3599, in Bering Sea, lat. N. 52° 05′, long. W. 177° 40′, in 55 fathoms (No. 20529 U. S. N. M.).

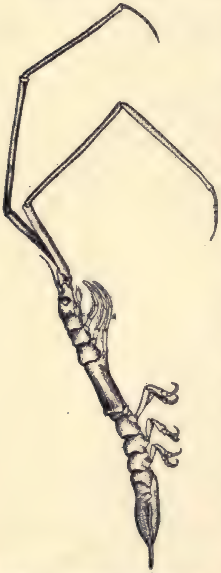

FIG. 5.—*Arcturus glabrus*, ♂. (× 1¼.)

Arcturus beringanus sp. nov.

The head is excavated in front; the lateral projections are broad; deep constrictions or depressions exist both in front and behind the eyes. The antennæ when laid off on the body reach the base of the abdomen; the fourth and fifth articles are very long; the flagellum is composed of seven or eight articles; the antennulæ reach to the end of the second article of the antennæ.

The first and last three segments of the thorax are nearly equal in length; the fourth segment is a little more than twice as long as any of the others. The posterior margins of the segments are concave on each side of the median line to the posterior angle of the segments, making a more or less acute point at the middle of the segment and lobate posterior angles.

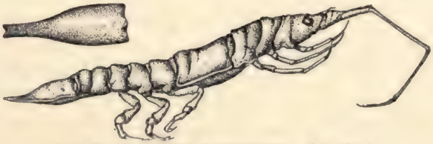

FIG. 6.—*Arcturus beringanus*. (× 2½.)

The abdomen is elongated and slender; the first and second segments are clearly defined; a third is indicated by a deep and irregular constriction; the terminus is incised.

A large number of specimens show a light line running along the median line of the dorsal surface and along the sides in line with the eyes. The dark colored or shaded portions of the surface are made up of numerous black spots. Now and then a large female is very light in color, the lines being but slightly indicated.

The largest specimens are 18 mm. in length.

Station 3252, lat. 57° 22′ 20″ N., long. 164° 24′ 40″ W.; depth 29½ fathoms; specimens very numerous. (Type, No. 20529, U. S. N. M.) Station 3253, lat. 57° 05′ 50″ N., long. 164° 27′ 15″ W.; depth 36 fathoms; four specimens. Station 3637, lat. 57° 06′ 30″ N., long. 170° 28′ 00″ W.; depth 32 fathoms; one female with a single young clinging to the antennæ.

Arcturus tenuispinis sp. nov.

This species is very close to *A. cornutus* Beddard. The head is deeply excavated in front; a pair of spines arise in front of the interocular space and extend forward, diverging a little more than those of *A. cornutus.* The first segment of the antennæ extends beyond the lateral projections of the head not more than 0.2 of a mm.; the second joint measures about 1.4 mm. on the upper surface, the third joint 5 mm., and the fourth 13 mm. in length; the fifth joint is lost or broken in both specimens. The antennulæ reach the middle of the third segment of the antennæ. The first and second thoracic segments are both armed with epimeral spines and a pair farther back and higher up on the segment; the other segments of the thorax have epimeral spines only; the first segment of the abdomen has a pair of spines in line with the epimeral spines of the thorax; the second segment is altogether unarmed; the last segment has two paired spines and one unpaired; the latter is at the terminus of a dorsal carina which can only be made out with difficulty. The largest spines on the body are the pair at the sides on the proximal end; the spines at the distal end are slender; the terminal outline of the segment is rounded.

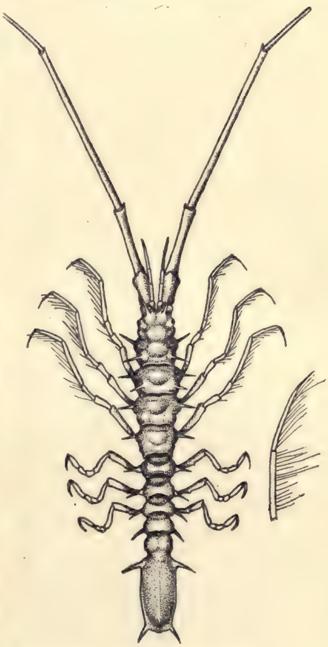

Fig. 7.—*Arcturus tenuispinis.* (× 2.)

A. tenuispinis can be distinguished from *cornutus* by the more slender spines, by the lack of the extra pair on the third and fourth segments of the thorax, the unarmed second segment of the abdomen, the lack of spines on the joints of the anterior series of ambulatory legs, and by the outline of the abdomen. Length of the largest specimen 23 mm.

Station 2756, off Cape St. Roque, Brazil, lat. 3° 22′ 00″ S., long. 37° 49′ 00″ W., 417 fathoms; two males (No. 21252, U. S. N. M.).

Arcturus americanus Beddard.

Arcturus americanus Beddard, Report on the Isopoda collected by the 'Challenger,' p. 104, pl. xxiii, figs. 5-8, 1886.

Color of specimens in alcohol: Body light straw color; the head is shaded with purple; this shade continues in two broken lines to the sixth segment, where the lines are united, spreading again on the abdomen. Another broken line runs along the second, third, and fourth segments at a little distance above the epimera; on the posterior segments the line is continued close to the epimera. There are two purple rings on the third joint of the antennæ and a broad band near the distal ends of the fourth and fifth joints.

Specimens were obtained at two stations off the east coast of Patagonia: Station 2768, lat. 42° 24′ 00″ S., long. 61° 38′ 30″ W., 43 fathoms; Station 2770, lat. 48° 37′ 00″ S., long. 65° 46′ 00″ W., 58 fathoms; four specimens.

Arcturus multispinis sp. nov.

The head is a little elongated; the front is concave. The eyes are round and stand out from the sides of the head as hemispheres. Two spines are placed near the front in advance of the line of the eyes and a transverse line of six a little behind the eyes; the terminal spines of the row are much smaller than the others.

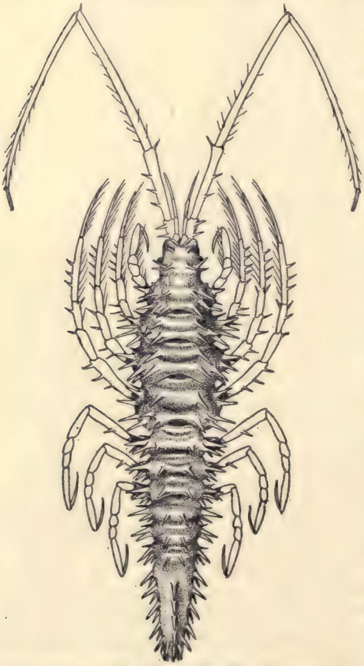

Fig. 8.—*Arcturus multispinis.* (× 2½.)

The antennæ are 28 mm. in length and slender in comparison with those of the Arctic forms; there are two spines on the second segment and two on the third segment of one, and three on the other; the fourth segment is armed with a single spine at its articulation with the fifth segment; the fifth segment is considerably longer than the fourth; the flagellum is short and without joints.

The two spines near the front form the anterior ends of two rows that extend to the last segment of the abdomen; the first four segments of the thorax have a transverse constriction making them in appearance double segments; both the anterior and posterior portions of these segments furnish a pair of spines for the lateral dorsal lines of spines; after the fourth segment there is but a single pair to a segment; the lines are not continued on the last segment, but are here replaced by a row of five spines on the median line of this elongated segment.

The second segment of the thorax is soldered to the head as in other species, otherwise its dorsal armature is like that of the three following segments. The epimera of the four anterior segments of the thorax are moderately extended and bear from two to four spines; between the epimera and the lateral dorsal lines are two spines; there is another spine just behind the epimera.

The three posterior thoracic segments are much shorter and narrower than the preceding segments; the epimera bear but a single spine; the spines of the lateral dorsal lines are smaller than the anterior spines of the line; on the fifth segment, between the line and the epimera, are three spines; on the sixth two spines, on the seventh one spine. The first two segments of the abdomen are dorsally like the last segment of the thorax; the last segment is elongated and bears five rows of spines—one on the median line and two on each side; there is a longitudinal row of five spines on each valve of the operculum. Length of body 23 mm.

Station 2807, off the Galapagos Islands, lat. 0° 24′ 00″ S., long. 89° 06′ 00″ W., 812 fathoms. One female with eggs (No. 21253, U. S. N. M.).

Arcturus murdochi sp. nov.

Arcturus hystrix Harger in Murdoch, Report Expedition to Point Barrow, Alaska, p. 142, 1885.

This species is closely related to *A. hystrix*, Sars, from off Helgoland and Lofoten, from depths ranging from 350 to 457 fathoms. Both specimens of *A. murdochi* came from 13½ fathoms 10 miles west of Point Franklin, Alaska, collected by the Point Barrow Expedition.

The head is deeply concave in front; the sides of the head extend forward in front of the eyes and end in bifurcate projections. On the front margin of the head is a single spine, conspicuous in being the only spine occupying the median line throughout the length of the animal. A spine on each side of the median spine divides the space between the eyes, making a row of three spines on the front of the head just in advance of the anterior line of the eyes. The median spine is a little in advance of the other two. A row of eight spines occupies the posterior part of the head; four of them are higher up than the eyes—one pair behind the eyes and one below on the margin of the head; the spines behind the eyes are the smallest.

The antennulæ are very short and small, hardly reaching the antepenultimate joints of the large antennæ; the basal joints are wider and shorter than those shown by Professor Sars in his figures of *hystrix*. The basal joints of the antennæ are small and are concealed from a dorsal view by the lateral projections of the head.

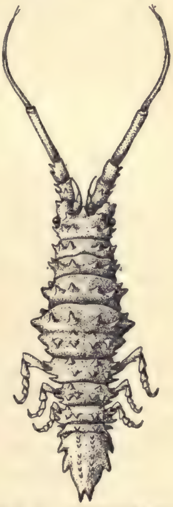

Fig. 9.—*Arcturus murdochi.*
(× 3½.)

The second joint is about as broad as long and is armed with three short spines; the third joint is armed with two spines pointing outward and upward; the fourth and fifth joints are long and slender, unarmed; the flagellum has but three joints. The first thoracic segment, as in *hystrix*, has a transverse row of eight spines; the thin sides of the segment extend forward under the head; the second and third segments also have eight spines arranged as in the first. The fourth segment is so constricted in the middle as to give it the appearance of two segments anchylosed; this segment has a double row of eight spines; between the two median spines of the posterior row and the constriction are two additional spines; these spines are smaller than those of the median rows, taking the arrangement longitudinally. The fifth, sixth, and seventh segments have spines regularly placed on each side of the median line; next farther down on the segment are two spines longitudinally placed; next, on the margin, are three spines united at the base, the middle one largest. The first abdominal segment is very short, with a transverse row of six spines; on the second segment spines are placed on the two median lines only; these are doubled and crowded. On the terminal segment there are two rows of small spines regularly placed on one specimen and disarranged on the other. The abdomen is terminated by two blunt divergent spines. The specimens are sparsely set with short, stiff hair. All of the legs are armed with a single spine on the basal joint.

This species can readily be distinguished from *hystrix* by the median spine of the head, by the extra pair of spines on the fourth segment of the thorax, by the armature of the antennæ, and by the arrangement of the spines on the abdomen.

As Professor Sars suggests, *hystrix* may be made the type of a new genus; it will then be necessary to place this species with it. (No. 7915, U. S. N. M.)

Astacilla granulata (G. O. Sars).

Leachia granulata G. O. Sars, Arch. Math. Nat., II, p. 351, 1877.
Astacilla americana Harger, Am. Journ. Sci., (3) XV, p. 374, 1878.
Astacilla granulata Harger, Proc. U. S. Nat. Mus., II, p. 161, 1879.
Astacilla granulata Sars, Nor. N. Atlan. Expd., Crust., p. 107, pl. ix. figs. 27-35, 1885.

One specimen from the Gloucester fishermen, Grand Banks.

Astacilla diomedeæ sp. nov.

The head is excavated in front, nearly rectangular, a little broader behind than in front. The eyes are but little swollen, are round, and are situated a little anterior to the middle of the margin.

The antennæ are closely like those of *Astacilla nodosa* (Dana).

The first segment of the thorax has the same width as the head; the second and third segments are successively wider and also shorter than the first; the fourth segment is very wide at the anterior end, as in *nodosa;* like the latter, it tapers gradually backward to the fifth segment. The segments posterior to the fourth are longer than the first three and are successively narrower.

The abdomen is constricted at the base and has subparallel sides; from the slight postero lateral protuberance it narrows rapidly to the apex.

The animal is throughout smooth and glabrous; the median line is light in color; on the fourth segment the light color broadens out and the sides are blotched with dark shadings made up of small black spots; all the articles of the antennal peduncles have a narrow ring of black at the distal ends, except the fifth.

Described from a single female dredged by the 'Albatross' in the Straits of Magellan from a depth of 17 fathoms (Station 2774). The marsupium is filled with eggs (No. 21251, U. S. N. M.).

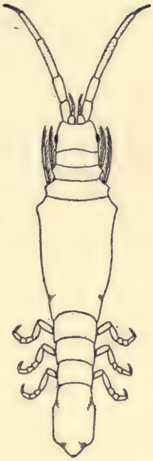

Fig. 10.—*Astacilla diomedeæ.* (× 6.)

Astacilla cæca sp. nov.

The head is deeply excavated to receive the antennulæ; the excavation is deeper at the sides than on the median line; a rostriform point extends between the antennulæ. The lateral prolongations of the head have two paired digital processes near the lower margin; one pair only can be seen from above. The antennæ reach back to the end of the sixth segment. As in other species of the genus, the first thoracic segment is solidly united to the head; the lower margins of the segment are tubercular. The second thoracic segment is short and narrow; the third is a little longer and wider; the fourth or long segment is yet wider at the anterior end, caused by the swellings at the insertions of the legs; after this it tapers gradually to near the posterior end, where the taper is more rapid. The fifth, sixth, and seventh segments are successively narrower. The median line of the head and thorax is tubercular; the head has one tubercle near the front and another on the postcephalic lobe; all thoracic segments have a tubercle on the line; the lateral margins of all are angular; above the epimeral projections of the fifth segment are four paired tubercles. The first segment of the abdomen is narrow and forms a neck between the thorax and the broad and angular terminal segment. The terminal segment has a pair of angular projections on each side of the margin; between the angles the margin is but little arcuate; posterior to the last angular projection the outline is that of an equilateral triangle. Attached to the carapace are several specimens of Foraminifera which Dr. Flint tells me belong to the genus *Truncatulina.*

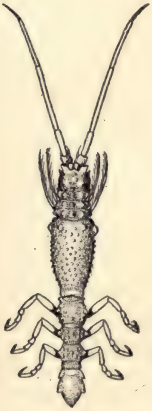

Fig. 11.—*Astacilla cœca.* (× 3.)

Both specimens have been repeatedly examined for a trace of eyes without success.

Length of the large specimen (female) 9 mm., measured from the front.

Station 2714, lat. 38° 22′ 00″ N., long. 70° 17′ 30″ W., 1825 fathoms (No. 12026, U. S. N. M.).

VOL. XII, PP. 53-55 MARCH 24, 1898

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

TWO NEW ISOPODS OF THE GENUS *IDOTEA* FROM THE COAST OF CALIFORNIA.*

BY JAMES E. BENEDICT,

Assistant Curator, Division of Marine Invertebrates, U. S. National Museum.

The two species described in this paper come within the limits of *Idotea* as recognized by E. J. Miers in his monograph of the Idoteidæ.† If several more species are found with the epimeral characters of *Idotea carinata* Lucas and *I. rostrata* here described, the former species may become the type of a distinct genus. At present the division would, in my opinion, be unwarranted.

Idotea rostrata sp. nov.

This species is probably more nearly related to *Idotea carinata* Lucas ‡ than to any other described *Idotea.*

The head is excavated in front; the antero-lateral angles are rounded and upturned. The eyes are lateral, large and very slightly projecting. Above the eyes the head is elevated. The head projects forward on the median line forming a tubercular rostrum. In the larger specimen the occipital suture is an irregular impressed line; the entire surface of the head is minutely rugose. The articles of the peduncle of the antenna are short and stout; the length of any article not being more than two or two and one-half times its greatest width. The flagellum on one side is composed of seven stout and distinct segments, on the other side of six.

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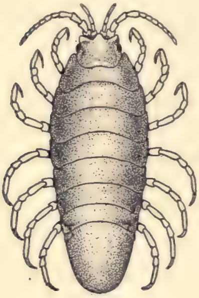
* Published by permission of the Secretary of the Smithsonian Institution.

† Journ. Linn. Soc. Lond., XVI, pp. 1–88, 1883.

‡ Lucas, Hist. Nat. des Anim. in Expl. Sci. Algérie, Crust., p. 60, pl. vi, fig. 1, 1849. Miers, Journ. Linn. Soc. Lond., XVI, p. 58, 1883.

The antennulæ reach the distal margin of the third segment of the antennæ; their basal joints are broad.



FIG, 12.—*Idotea rostrata.* (× 3.)

The thorax is convex and nearly smooth; the first, sixth, and seventh segments are about equal in length; the third, fourth, and fifth are broadest; the second is intermediate; the first segment, as in *carinata*, is deeply excavated, the antero-lateral lobes reaching to the eyes; both lateral angles of the other segments are about equally rounded. The epimera show only on the three posterior segments; on the fifth it shows slightly on the middle of the margin; on the sixth it occupies the posterior two-thirds and is quite broad posteriorly; on the seventh its occupies one-half the margin and is triangular in form.

The legs are moderately slender. With the exception of the first pair, the basal articles of all have a small tubercular protuberance.

The abdomen tapers with the body and is evenly rounded behind; it consists of a single segment with a suture near the base as in *Synidotea*. The operculum is not crossed by an oblique line. There is a broad shading of purple along the dorsum. The margins of the articles of the antennæ and the dactyls are rosy.

This description is made from two females from San Pedro, California, presented by Mr. S. J. Holmes. The larger specimen is 12 mm. in length. The sides of both are arcuate as is usual in the females of *Idotea.*

Idotea stenops sp. nov.

A single large female *Idotea* is in the collection from Monterey, California, where it was taken by Mr. Henry Hemphill.

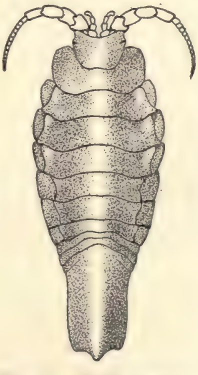


FIG. 13.—*Idotea stenops.* (Natural size.)

In general appearance the species closely resembles *I. ochotensis*, but more careful examination shows it to be specifically distinct. The outline of the body is similar to that of the female of *ochotensis*. The head is more deeply excavated on the anterior margin than in that species. The posterior margin is concave.

The eyes are situated a little behind the middle of the exposed lateral margin and are five times longer than broad, placed transversely just anterior to the eye, the surface and margin excavated.

The antennæ are similar to those of *ochotensis*, but the flagellum has 15 articles.

The thorax is widest at the third and fourth segments. The epimera of the second segment reaches the postlateral angle and is much wider in the anterior portion. The epimera of the third and fourth segments are widest in the middle and cover the ends of the segments with the exception of the apex of the posterior angles. The epimera of the fifth, sixth, and seventh segments cover the ends of the segments and are very wide on their posterior margins.

The epimera of *ochotensis* are strikingly different. In the second segment they occupy the anterior half of the margin, in the third about three-fifths, and in the fourth the anterior three-quarters. The epimera of the fifth segment covers all but the apex of the posterior angle. The margins of the sixth and seventh segments are covered by the epimera. In the last three segments the anterior part of the epimera is narrow where in *stenops* it is wide.

The abdomen of *stenops* is composed of three segments. Another segment is indicated by a suture. The basal half of the abdomen is tapering; the posterior half has parallel sides; the posterior angles are rounded and very slightly produced behind. The apex is acute. The surface of the body below the median line is flattened, forming an obtuse ridge from the base of the head to the apex of the abdomen.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

DESCRIPTION OF NEW BIRDS FROM MEXICO, WITH A REVISION OF THE GENUS *DACTYLORTYX.*

BY E. W. NELSON.

Further study of the Mexican birds in the collection of the Biological Survey, U. S. Department of Agriculture, reveals the presence of several apparently undescribed species and subspecies. These new forms, like those already described from this collection, were obtained by Mr. E. A. Goldman and myself during our explorations in Mexico for the Biological Survey. Our work has covered a large portion of that country, and although far from exhaustive has been conducted systematically, with the desire to secure series of specimens from various altitudes and areas with a view to determining the faunal relationships of the different sections. Up to the time our work began, some six years ago, ornithologists had given little consideration to the fact that Mexico has various well-defined climatic areas aside from the two main divisions of highland or temperate, and lowland or tropical. The fact is that the highlands contain several definite faunal areas, and the same is true of the lower tropical lands. Faunal work in the United States has shown very clearly the differentiation produced in wide ranging species by varied climatic conditions. In many instances this variation is so gradual that the different extremes are given subspecific rank; in others the resultant forms are sufficiently segregated to be accepted as full species. Precisely the same state of affairs exists in Mexico. The material collected illustrates these conditions, and will aid materially in working out the subordinate faunal areas of that country.

I have to acknowledge again my indebtedness to Dr. C. Hart Merriam, Chief of the Biological Survey, for his interest in the work on Mexican Birds, and to Mr. Robert Ridgway, Curator, and Dr. Chas. W. Richmond, Assistant Curator, of Birds in the National Museum, for continued favors at their hands.

All measurements are in millimeters.

Heleodytes brunneicapillus obscurus subsp. nov. Mexican Cactus Wren.

Type No. 142789, U. S. Nat. Mus., Biological Survey Coll. Ad. ♂, Tula, Hidalgo, Mexico, March 9, 1893. Collected by E. W. Nelson and E. A. Goldman.

Distribution.—Tableland of Mexico.

Description.—Similar to *H. brunneicapillus*, from which it differs mainly in its smaller size, darker crown, grayer back, more spotted chin, and the obsolescence of white streaks on back.

Average dimensions of *H. brunneicapillus obscurus:*

Ad. ♂ (5 specimens): wing 85.8; tail 77.8; culmen 22.8; tarsus 27.6.
" ♀ (5 "): " 84.4; " 77.4; " 21.6; " 26.4.

Averages of *H. brunneicapillus* (from southern California and Arizona):

Ad. ♂ (5 specimens): wing 90.4; tail 84.4; culmen 23.2; tarsus 29.2.
" ♀ (5 "): " 85.2; " 81.8; " 21.6; " 27.2.

The crown and nape on birds from the Mexican tablelands are sepia or clove brown instead of burnt umber, as in those from southern California and the southern border of the United States in general. This southern form is dark grayish-brown on the back, lacking the paler or more rufous shade of *brunneicapillus* proper. The white shaft lines of the dorsal feathers are much reduced in width and are commonly broken up into isolated spots. In viewing the dorsal surface of a series of the two forms placed side by side the notable amount of streaking on typical *brunneicapillus* contrasts strongly with the broken streaks and irregular white spotting on the backs of *obscurus.*

Specimens from northern Zacatecas show an approach to the northern bird; those from the State of Nuevo Leon, in northeastern Mexico, are intermediate in some characters, but may possibly represent a form peculiar to the Tamaulipan region. Nearly typical representatives of *H. brunneicapillus* and *H. b. obscurus* are represented in the U. S. National Museum series from southern New Mexico, and it is possible that both may occur there, each having its range limited to certain altitudes. In this case I should expect to find true *brunneicapillus* ranging below *obscurus.*

The distribution of the two forms, so far as the material at hand allows me to determine, is as follows:

H. brunneicapillus.—Southern border of the United States from southwestern Utah and southern California to Sonora, Mexico, and possibly to the lower Rio Grande, and the states of Nuevo Leon, and Tamaulipas, Mexico.

H. brunneicapillus obscurus.—Tableland of Mexico from near northern boundary to the Valley of Mexico and northern Puebla. This range includes all or a large part of the states of Mexico, Hidalgo, Michoacan (northern portion), Queretaro, Guanajuato, Jalisco, Zacatecas, Aguas Calientes, San Luis Potosi, Durango, Chihuahua, and Coahuila.

Several specimens in the series from the southwestern United States, representing true *brunneicapillus*, as well as others from the region occupied by *obscurus*, have a buffy suffusion extending over the upper part of the breast and becoming gradually deeper in shade thence back to the flanks. This appears to be merely a high condition of plumage.

Vireo nanus sp. nov. Dwarf Vireo.

Type No. 144890, U. S. Nat. Mus., Biological Survey Coll. Ad. ♂, Querendaro, Michoacan, Mexico, Aug. 9, 1892. Collected by E. W. Nelson.

Distribution.—Southern border of the Mexican tableland, in Michoacan.

Description of type.—Entire dorsal surface grayish olive-green, becoming browner on head and shoulders and greener on rump and upper tail coverts. Wings and tail blackish-brown, outer borders of feathers edged with olive-green; lores and superciliary stripe grayish-white; ear coverts and sides of neck olive-gray. Lower parts white with a faint grayish shade across breast. Two narrow wing bars formed by white edges to primary and secondary coverts; first primary half the length of second; fourth primary longest; tail about four-fifths the length of wing; bill black; legs and toes blackish. Wing 54; tail 43; culmen 10; tarsus 17.

The type and only known specimen of this bird is in badly worn summer plumage. The perfect plumage is probably clearer green than shown by the type. The bill is more slender and terete than in any species of Vireo known to me, and is not typically vireonine in this character; otherwise the bird seems to belong in the genus where it is placed.

Progne sinaloæ sp. nov. Sinaloa Martin.

Type No. 157171, U. S. Nat. Mus., Biological Survey Coll. Ad. ♂, Plomosas, Sinaloa, Mexico, July 18, 1897. Collected by E. W. Nelson and E. A. Goldman.

Distribution.—Western slope of the Sierra Madre, Sinaloa (between 2500 and 4000 feet alt.).

Description of adult male.—Entire head, neck, breast, flanks, and dorsal surface uniformly glossy blue-black, thinly overlaid with wash of glossy black formed by black edges of feathers; chest, abdomen, under tail coverts, and concealed spot on each side of back pure white. Wings and tail black.

Dimensions of type.—Wing 136; tail 71; culmen 10; tarsus 12.5; depth of fork of tail 20.

Averages of 4 males: wing 134.2; tail 72; culmen 11.1; tarsus 13.2; depth of fork of tail 18.2.

Averages of 4 males of *Progne dominicensis* (from West Indies): wing 144.5; tail 75; culmen 11.9; tarsus 15.1; depth of fork of tail 20.5.

P. dominicensis (Gmel.) of the West Indies is the only species with which *P. sinaloæ* need be compared. The latter may be distinguished by its smaller size, pure white under tail coverts, glossy black tips of feathers on dorsal surface (overlying the glossy blue-black of general color), and the steel-blue-black as contrasted with the decidedly purplish-blue-black of *dominicensis*. The general appearance of the two species is very similar.

We found *P. sinaloæ* at an altitude of about 3500 feet on the western slope of the Sierra Madre in Sinaloa. They were seen in only one place, at the upper border of the tropical zone about the point of a ridge facing the hot lowlands. A flock of from twenty to thirty passed several hours each day, circling about the hillslope in pursuit of insects. The flock was made up entirely of males and no females were seen. A native hunter living near the place where the birds were found told me that they occur at this point throughout the year. He could give no information about their nesting haunts, which were probably not far from this place. We looked for them without success when we went into the same mountain a little farther to the south.

It was unexpected to find in northwestern Mexico a species so like the West Indian one and so different from the two species of the genus which range over the mainland of central and eastern Mexico.

Phœnicothraupis rubicoides roseus subsp. nov. Rosy Tanager.

Type No. 156121, U. S. Nat. Mus., Biological Survey Coll. Ad. ♂, Arroyo de Juan Sanchez (50 miles north of Ixtapa, Jalisco), Territory of Tepic, Mexico, April 5, 1897. Collected by E. W. Nelson and E. A. Goldman.

Distribution.—Basal slopes of mountains in western Tepic and Jalisco, Mexico.

Description of type.—Crown rich dark vermilion-red, bordered along the sides by black; forehead, sides of head, neck, and remainder of dorsal surface dull red with a wash of rose color; wing feathers dark brown bordered externally with same color as back; tail dull red. Entire under surface dull rose-red, deepest on throat and breast, lightest and clearest on abdomen and crissum; flanks washed with brown. Dimensions of type: wing 92; tail 87; culmen 18; tarsus 26.

In general the male of this bird has the rosy color of a pale specimen of *Phœnicothraupis rubra*, very different from the brick-red of typical *P. rubicoides*. It is nearer *P. rubicoides affinis*, from which the male is distinguishable by its paler colors. The crest differs also in being a deeper, more brilliant red than in either of the two other forms. The female of *P. r. roseus*, compared with those of *P. rubicoides* and *P. r. affinis*, has a more olive-green back with little trace of the brown so characteristic of the others; the yellow crest is much less strongly marked and has but slight traces of a blackish border; the under surface is olive-brown, of a much clearer or greener shade. It is decidedly smaller with much smaller bill.

Contrasted with typical *rubicoides*, this form is very different, but our series of specimens from various localities in Vera Cruz, and thence through the Isthmus of Tehuantepec and up the west coast to Jalisco, show that it is merely a geographical race of that species.

Amphispiza bilineata grisea subsp. nov. Mexican Black-throated Sparrow.

Type No. 136006, U. S. Nat. Mus., Biological Survey Coll. ad. ♂, Tula, Hidalgo, Mexico, March 9, 1893. Collected by E. W. Nelson.

Distribution.—Southern part of Mexican tableland from northern San Luis Potosi to northern end of Valley of Mexico.

Differs from typical *A. bilineata* in larger size, proportionately shorter bill and tarsus, darker and grayer dorsal surface, and smaller white areas on ends of tail feathers.

Averages of typical *Amphispiza bilineata* (southern Texas and northeastern Mexico):

Ad. ♂ (5 specimens): wing 64.4; tail 57.8; culmen 10.6; tarsus 18.9.
“ ♀ (2 “): “ 62; “ 57; “ 10.7; “ 19.

Averages of *A. bilineata grisea* (San Luis Potosi and Hidalgo):

Ad. ♂ (8 specimens): wing 69.1; tail 63.4; culmen 10.5; tarsus 19.
“ ♀ (3 “): “ 66.6; “ 60.6; “ 10.8; “ 19.

The present race inhabits a region in which the species was previously unknown, thus leaving it without definite synonymy. The following citations, however, might be doubtfully referred to it:

Poospiza bilineata (*nec* Sclater, 1850) Scl., Cat. Am. Birds, 110, 1862 (Mexico); Scl. and Salv. Nom. Av. Neotrop., 30 part (Mexico), 1873.

Guiraca chiapensis sp. nov. Chiapas Grosbeak.

Type No. 144319, U. S. Nat. Mus., Biological Survey Coll. Ad. ♀, Ocozocuautla, Chiapas, Mexico, August 19, 1895. Collected by E. W. Nelson and E. A. Goldman.

Distribution.—The type and only known specimen was taken on the low tableland of western Chiapas at an altitude of about 3000 feet.

Description of type.—Entire dorsal surface dark brown, upper tail coverts shaded with grayish; feathers of back darkest along shafts with narrow, indistinct edging of lighter brown; top of head and neck nearly uniform dark brown with distinct gloss of blue; this blue gloss is faintly visible also on sides of neck and shoulders. Wings slightly darker brown than back and crossed by two bands of dull buffy formed by narrow tips to greater and lesser coverts; the band on lesser coverts broadest. Ear coverts and cheeks dark, dingy buffy-brown; feathers on middle of chin and throat whitish at base and dull buffy on outer half; feathers on sides of chin, throat, and under surface of neck and breast dull brownish with dingy buffy edges. Rest of lower parts much lighter, the feathers with dark shaft lines and bordered along edges by pale grayish and buffy. Dimensions: Wing 90; tail 72; culmen 21; greatest depth of bill 16; greatest width of under mandible 14; tarsus 23.

Average dimensions of four adult females of *Guiraca cœrulea eurhyncha* (from central and southern Mexico): wing 87.5; tail 67; culmen 17.2; greatest depth of bill 12.9; greatest width of under mandible 11.2; tarsus 21.5.

Averages of four adult females of *Guiraca c. eurhyncha* (from southern Arizona): wing 84.5; tail 65.2; culmen 16.9; greatest depth of bill 13.1; greatest width of under mandible 11; tarsus 21.4.

The type of *G. chiapensis* is in worn breeding plumage and is very similar in color to a female of *eurhyncha* taken at the same season in southern Arizona, but may be distinguished at once by its huge bill, as shown in the accompanying figure (fig. 14 *a*); it is lighter and less buffy on lower parts, particularly on breast and neck. This species is probably a resident of central Chiapas and perhaps bears the same relationship to *Guiraca eurhyncha* in size and range that *Passerina sumichrasti* does to *P. parellina*.

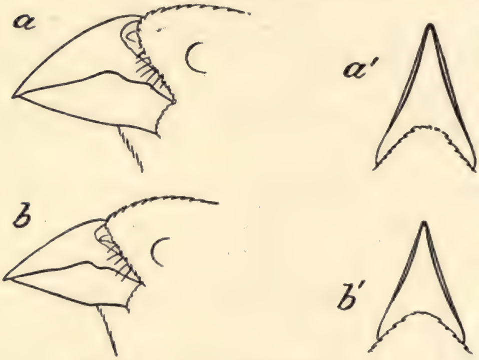

FIG. 14.—*a, Guiraca chiapensis.*
b, Guiraca cœrulea eurhyncha.

In the district where the type of *G. chiapensis* was taken, Blue Grosbeaks were common and probably were all or nearly all of this species. Unfortunately, not having distinguished the latter from *eurhyncha* at the time of our visit, we failed to secure other specimens.

Grallaria ochraceiventris sp. nov. Buff-bellied Ant Thrush.

Type No. 156013, U. S. Nat. Mus., Biological Survey Coll. Ad. ♂, San Sebastian, Jalisco, Mexico, March 16, 1897. Collected by E. W. Nelson and E. A. Goldman.

Distribution.—Heavy forests in western Jalisco, and perhaps elsewhere in western Mexico north of Tehuantepec.

Description of type.—Feathers of crown and back olive-brown, shaded with fulvous, and narrowly margined with black; sides of crown, back of orbits, and nape olive-brown with a dark ashy shade most marked on sides of crown; forehead paler or more fulvous brown. Tertiaries and secondaries dull rusty brown; outer vanes of primaries shading from dull rusty brown to dull tawny brown on outer quills; wing coverts dull brown with shaft lines and spots of dull tawny brown at tips. Under coverts and axillars pale buffy; inner webs of quills at base still paler buffy, becoming grayish brown on outer half; tail and upper tail coverts light rusty brown. Lores and malar patch pale, dull grayish-white, shaded with dingy fulvous; under eyelids blackish; ear coverts dark olive-brown washed with blackish; chin, throat, and patch on middle of breast whitish washed with fulvous; feathers bordering breast-patch scantily black tipped; sides of throat, breast (except whitish patch), chest, and flanks dingy buffy. Abdomen pale buffy, crissum darker, richer buffy.

Dimensions of type.—Wing 114; tail 43; culmen 28; tarsus 47.

This species is most like *G. mexicana*, from which it is distinguishable by its generally paler colors; obsolescence of ashy on crown and nape; much scantier black margins to feathers on dorsal surface, and shorter tarsus.

Amazilia cinnamomea saturata subsp. nov. Chiapas Humming Bird.

Type No. 155297, U. S. Nat. Mus. Biological Survey Coll. Ad. ♂, Huehuetan, Chiapas, Mexico, March 2, 1896. Collected by E. W. Nelson and E. A. Goldman.

Distribution.—Heavily forested foothills on Pacific coast of Chiapas, near border of Guatemala.

Description.—Back and wing coverts dark coppery bronze; wings dark purplish; entire lower parts rich dark cinnamon, approaching chestnut, throat a little paler; tail very dark chestnut with broad tips of dark bronze.

Measurements of type.—Wing 55; tail 36; culmen 22.5.

The following average measurements show the relative sizes of *Amazilia cinnamomea* from western Mexico, north of Tehuantepec, and the new form:

A. cinnamomea, adult ♂ (7 specimens): wing 57.9; tail 36.6; culmen 22.
A. c. saturata, adult ♂ (3 specimens from Huehuetan, Chiapas): wing 55; tail 35; culmen 22.3.

This form differs from typical *cinnamomea* mainly in its much darker or more intense colors; its wings and tail are a little shorter, and the bill is proportionately longer.

At first I was inclined to consider this bird *Trochilus corallirostris* Bourc. and Muls. (Ann. Sci. Phys. et Nat., Lyons, IX, p. 328, 1846), which was described from a specimen taken at Escuintla, Guatemala. Upon looking the matter up, however, I find that Mr. Elliot described the type of *T. corallirostris* in his Synopsis of the Humming Birds (p. 119) under *Amazilia cinnamomea.* The measurements of Bourcier's type, as given by Elliot and reduced to millimeters, are as follows: Wing 57.1; tail 44.5; culmen 22.2. These measurements indicate that it is true *cinnamomea.* The discrepancy in the length of the tail compared with my averages is due to a difference in methods of measuring. The series of true *A. cinnamomea* contains specimens from various localities in western Mexico between Mazatlan and Tehuantepec; also from Yucatan, Honduras, Salvador, and Nicaragua. Throughout this wide range the species holds its characters with surprisingly little variation. *A. cinnamomea* inhabits areas overgrown with scrubby forest of an arid tropical character. *A. c. saturata* was found in the borders of the great humid tropical forests of the foothills in southern Chiapas, and probably ranges along the slopes of these mountains into western Guatemala. A single specimen from Tehuantepec is intermediate between true *cinnamomea* and *saturata*, upon the strength of which I have given the present bird subspecific rank.

Revision of the genus DACTYLORTYX Ogilvie-Grant.

Dactylortyx Ogilvie-Grant, Cat. Birds Brit. Mus., XXII, 429, 1893. Type *Ortyx thoracicus* Gambel.

In the Proceedings of the Philadelphia Academy of Sciences for 1848 (vol. IV, p. 77), Dr. Gambel described *Ortyx thoracicus* from a specimen obtained by Mr. Pease at Jalapa, Vera Cruz, Mexico. In 1850 Mr. Gould published his *Odontophorus lineolatus*, giving a colored figure of both sexes and a description of the female (Mon. Odont. III, pl. 32, with text, 1850). Gould's figures and description were based on a pair of birds in the Berlin Museum, labeled by Lichtenstein with the unpublished name *Perdix lineolata*. These birds came from Mexico without any definite locality, and Gould considered them identical with Gambel's species, but used Lichtenstein's manuscript name. In 1893 Ogilvie-Grant made the genus *Dactylortyx* to receive the birds described by Gambel and Gould, which he considered identical and called *Dactylortyx thoracicus*. He gave the range of *D. thoracicus* as 'Central America; southern Mexico, Yucatan, Guatemala, and San Salvador.' There is good reason to doubt that any species of grouse or partridge ranges over this area. The material at hand proves that Ogilvie-Grant's *D. thoracicus* is a composite species including several distinct birds.

Through the courtesy of Mr. Witmer Stone, Conservator of the Ornithological Section of the Philadelphia Academy of Natural Sciences, I have examined two specimens of true *D. thoracicus* from Jalapa, Mexico, one of which is Dr. Gambel's type. Unfortunately both are females and I have no male of the typical form to compare with the males of the others recognized below. The amount of individual variation does not appear to be great, judging from the two specimens of *D. thoracicus* and four specimens of the species in Chiapas and Guatemala, here described as *D. chiapensis*. After comparing the two typical specimens of *D. thoracicus* (Gambel) with Gould's plate and description of the female of his *O. lineolatus*, I am satisfied that they represent birds which are at least subspecifically distinct. The left-hand figure in Gould's plate represents a male and agrees very closely with a specimen in the U. S. National Museum, obtained by Mr. Sumichrast on the Gineta Mt., near Santa Efigenia, Oaxaca. This place is on the Pacific slope of Mexico near the border of Chiapas and gives a definite locality for the birds of this form. The species and subspecies recognizable in the material before me may be briefly characterized as follows:

Dactylortyx thoracicus (Gambel). Male unknown.

Female: Breast and flanks light rufous with shafts of feathers distinctly lighter, but with no definite shaft lines. Feathers of rump with heavy black cross-bars.

D. thoracicus lineolatus (Gould). Male: Breast and flanks ash-gray faintly washed posteriorly with buffy, and with broad well-marked white shaft lines.

Female: Similar to typical *thoracicus*, but breast and flanks with well-marked pale shaft lines.

D. chiapensis sp. nov. Male: Breast and flanks dark plumbeous-gray; feathers with narrow bright white shaft lines and indistinctly edged and barred with brown and blackish.

Female: Breast and flanks dark, dingy brownish-red washed with ashy on flanks; feathers with pale narrow shaft lines; no black bars on rump.

D. devius sp. nov. Male: Breast feathers dull ashy, broadly bordered with dull rufous and with fine white shaft lines. Flanks dull rufous with fine black mottling and wash of dull fulvous.

Female: Unknown.

Dactylortyx thoracicus (Gambel). Jalapa Partridge.

Ortyx thoracicus Gambel, Proc. Acad. Nat. Sci. Phila., IV, p. 77 (1848).
Odontophorus lineolatus Gray, List Gallinæ Brit. Mus., p. 73, 1867 (part, Cordova).
Dactylortyx thoracicus Ogilvie-Grant, Cat. Birds Brit. Mus., XXII, p. 429, 1893 (part).

Distribution.—Mountain slopes of eastern Mexico (north of Isthmus of Tehuantepec?).

Description of type.—No. 12404, Coll. Phila. Acad. Sciences, ad. ♀, Jalapa, Vera Cruz, Mexico. Collected by Mr. Pease.

Entire top of head blackish, variegated indistinctly with dark rufous and with paler shaft streaks which are dull rufous posteriorly. Feathers on back of neck dull rufous, heavily overlaid with black tips and bars; feathers of mantle with ashy centers and heavy borders of dark rufous brown, finely and indistinctly mottled with blackish. Scapulars with pale golden-buffy shaft streaks, lower webs pale ashy variegated and bordered with black and dark buffy, upper webs black, variegated with chestnut. Rump and upper tail coverts olivaceous brown, paler and more buffy on rump and darker brown on coverts; entire rump and upper tail coverts heavily barred and marked with black; tertials dark chestnut, handsomely variegated with black, and with black borders below and dark buffy borders above; wing coverts marked much as scapulars, but darker on lower webs. Primaries dark gray with dull buffy mottling along outer webs; secondaries dark gray, slightly mottled on inner and heavily mottled on outer webs with blackish, dull rufous and buffy. Tail dingy blackish variegated with buffy and dull rusty. Chin and throat whitish with wash of ashy and faint edging of blackish; sides of head with ear covers and superciliary stripe dark ashy. Sides of neck, breast all round, and flanks bright rufous, shafts of feathers a little paler. Feathers on sides of head and neck, including ear coverts, finely tipped or barred with black. Abdomen white; under tail coverts dark fulvous with heavy black subterminal markings.

The other female from Jalapa is similarly colored in every particular except on mantle where the rufous borders of feathers are duller and the gray centers more conspicuous.

The dimensions of these specimens are as follows: No. 12404, ♀ (type of species), wing 128: tail 48; culmen 14; tarsus 34. No. 12405, ♀ (topotype), wing 135; tail 50; culmen 14; tarsus 35.

Dactylortyx thoracicus lineolatus (Gould). Striped Partridge.

Odontophorus lineolatus Gray, Genera of Birds, III, p. 513 (1847), nomen nudum; Gould (*Perdix lineolata*, Licht. MS. in Mus. Berl). Mon. Odont. III, pl. 32, with text (1850); Bon., Compt. Rend., XLII, p. 883 (1856).

Strophiortyx lineolatus Gray, Hand List Birds, II, 272 (1870).

Dactylortyx thoracicus Ogilvie-Grant, Cat. Birds Brit. Mus., XXII, p. 429, 1893 (part).

Distribution.—Mountain slopes of southwestern Oaxaca and adjacent part of Chiapas.

Description of adult male.—(No. 116338, U. S. Nat. Mus. Santa Efigenia, Oaxaca, Mexico, Nov., 1880. Collected by F. Sumichrast). Lower neck, breast, and flanks gray with faint wash of buffy-brown anteriorly, becoming heavier along flanks; feathers marked with broad white shaft streaks. Crown dark brown with very fine shaft lines of pale buffy; nape feathers streaked with broad buffy shaft lines and black borders; feathers of mantle with narrow white shaft streaks and gray webs, mottled with dull chestnut and black along borders. Scapulars, tertials, and wing coverts with shaft lines of white or pale buffy; upper webs of these feathers irregularly mottled and barred with black and rich chestnut; lower webs grayish with wash of brown and marked with black lines along borders. Primaries and secondaries dark gray mottled with buffy along borders of primaries; secondaries more distinctly mottled and barred with buffy and blackish on outer webs. Back, rump, and upper tail coverts nearly uniform buffy-brown with fine dark mottling. Tail dark gray with blackish and buffy mottling in irregular cross-bars

Dimensions: Wing 132; tail 55; culmen 14; tarsus 35.

Dactylortyx chiapensis sp. nov. Chiapas Partridge.

Odontophorus thoracicus Scl. & Salv., Ibis, p. 276, 1860 (Volcan de Fuego, Guatemala). ?

Odontophorus lineolatus Gray, List Gallinæ Brit. Mus., p. 73, 1867 (part, Guatemala).

Dactylortyx thoracicus Ogilvie-Grant, Cat. Birds Brit. Mus., XXII, p. 429, 1893 (part).

Type No. 155539, U. S. Nat. Mus., Biological Survey Coll. Ad. ♂, San Cristobal, Chiapas, Mexico, Sept. 25, 1895. Collected by E. W. Nelson and E. A. Goldman.

Description of type.—Crown and nape mottled with black and dark chestnut; feathers on mantle with fine whitish shaft lines; webs grayish next shaft lines and shading outwardly into fine black mottling and then into a wash of dark vandyke-brown, deepest on borders. Back mottled with dull buffy-gray and blackish, former color predominating anteriorly; rump and upper tail coverts dark gray mottled with buffy and blackish, heaviest on tail coverts where some feathers have heavy shaft spots or lines. Tail blackish with irregular bars of grayish and buffy mottling. Scapulars, tertials, and wing coverts with bright narrow shaft lines of pale buffy; upper webs of scapulars and wing coverts heavily marked with transverse bands of black and dark reddish-brown, lower webs gray with irregular brown and black lines along edges; tertials rich reddish-brown mottled with blackish and broadly bordered with black and edged with a golden-buffy line. Primaries and secondaries gray, former with pale buffy spots along outer webs; latter barred irregularly with brown and buffy mottling. A broad superciliary stripe of rufous-buffy extends from bill to sides of nape, palest posteriorly. Ear coverts mottled black and brown; lores white; some feathers of lores and line below eyes tipped with black; feathers on sides of neck, just back of ear coverts, heavily tipped with black; chin, throat, and cheeks rich reddish-buffy. Lower neck, breast, and flanks gray with wash of dull olive-brown on edges of feathers and heaviest on flanks; the feathers have fine, sharply defined white shaft lines with transverse series of fine dark mottlings. Chest and abdomen white; feathers of under tail coverts buff with heavy, irregular dark bars and mottlings on basal two-thirds.

Dimensions.—Wing 129; tail 49; culmen 14; tarsus 36.

Description of female.—Differs from male in having the rufous and rufous-buff areas on head replaced by dark ashy-gray, and the gray area on breast and flanks replaced by rufous. Crown, dark grayish-brown, finely mottled with black and faint traces of rufous; feathers of nape black, barred subterminally with dark reddish-brown; a broad gray superciliary stripe terminates in a buffy line on each side of nape; ear coverts black in front, gray posteriorly. Feathers on hind neck gray and dull rufous-brown with whitish shafts and black spots near tips. Mantle with paler shade of gray and buffy markings. Pattern on scapulars, tertials, and wing coverts similar, but the brown decidedly redder and more pronounced. Back, rump, and upper tail coverts very similar, but tail coverts richer buffy with heavier black centers. Tail black, irregularly mottled transversely with gray, rufous, and buff. Chin and throat ashy, feathers black-tipped on sides of throat. Sides and lower part of neck, breast, and flanks marked with fine pale shaft streaks; general color of this area dull reddish-brown, richest on sides of neck and breast, duller and grayer posteriorly. Middle of chest and abdomen pale buffy; under tail coverts buffy, with heavy black markings. Dimensions: Wing 130; tail 45; culmen 13.5; tarsus 34.

A female from the Volcano of Santa Maria, Guatemala, is very similar to the one from San Cristobal, but is a trifle more rufous, with abdomen pure white and lower webs of scapulars and wing coverts brown and buffy instead of brown and ashy as on the bird just described. Dimensions: Wing 132; tail 50; culmen 14; tarsus 34.

Dactylortyx devius sp. nov. Brown-flanked Partridge.

Dactylortyx thoracicus Ogilvie-Grant, Cat. Birds Brit. Mus., XXII, p. 429, 1893 (part).

Type No. 155938, U. S. Nat. Mus., Biological Survey Coll. Ad. ♂, San Sebastian, Jalisco, Mexico, March 17, 1897. Collected by E. W. Nelson and E. A. Goldman.

Distribution.—Forests of western Jalisco, and probably other parts of western Mexico.

Description of type.—Middle of crown and nape dark chestnut-brown with blackish mottling; back of neck mottled coarsely with black and dark rufous; broad superciliary stripe from bill to nape dark buffy, continued on sides of nape by broad buffy-whitish shaft streaks on feathers bordered by black and dark rufous. Lores gray with fine black tips; chin, throat, and cheeks rich rufous-buffy; feathers from lores back under eye and along sides of neck tipped with black; ear coverts brown with pale shafts and dark tips. Feathers of hind neck and mantle with brownish gray centers, bordered with dark rufous-brown and finely mottled with black; scapulars finely barred with dark rufous-brown and edged with black; back rump and upper tail coverts grayish brown, finely mottled with buffy and blackish, the gray clearest on back; the buffy and dark mottling becomes gradually more intense posteriorily and the tail coverts are almost rufous. Tail blackish, finely mottled with brown, dark buffy and gray. Scapulars, tertials, and wing coverts with narrow, pale, buffy shaft streaks; upper webs black, barred and mottled with rufous; lower webs light gray, mottled with darker near shafts and black and brown near borders. Primaries dark gray with pale buffy spots along outer web; secondaries blackish, irregularly barred with buffy-brown mottlings on outer webs and across tips. Lower neck, breast, and flanks with fine white shaft lines. Webs of feathers on neck and middle of breast gray next shaft lines, shading externally into dull reddish-brown; same pattern on sides of breast and flanks, but reddish-brown more intense and spread over most of feathers. Chest and sides of abdomen buffy; middle of abdomen white; under tail coverts black, broadly tipped and mottled with dark buffy.

Dimensions: Wing 137; tail 57; culmen 15; tarsus 34.

Female unknown.

Vol. XII, pp. 69-71 March 24, 1898

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

DESCRIPTIONS OF SIX NEW GROUND SQUIRRELS FROM THE WESTERN UNITED STATES.

BY C. HART MERRIAM.

Of the six new Spermophiles here described, one (*oregonus*) belongs to the *armatus-beldingi* group, three are subspecies of *mollis*, and two subspecies of *tridecemlineatus*.

Spermophilus oregonus sp. nov.

Type from Swan Lake Valley, Klamath Basin, Oregon. No. 89177, ♀ ad., U. S. Nat. Mus., Biological Survey Coll., June 12, 1897. Collected by Vernon Bailey. Orig. No. 6005.

Characters.—Similar to *S. beldingi* in size and general characters but *grayer* and lacking the red dorsal area and head patch. Similar to *S. armatus* in color of upper parts, but under side of tail chestnut instead of grizzled gray and black.

Color.—Upper parts buffy-gray, grizzled with black hairs, sometimes becoming pale dull buffy-fulvous on middle of back; under parts buffy or buffy-yellowish, the dark basal fur showing through; nose sometimes pale buffy-fulvous; feet buffy-whitish; tail above: basally like back, distally becoming grizzled black and fulvous, with black tip and edged all round with hoary; tail below: deep chestnut bordered with black and edged with hoary, the black border forming a broad band across end.

Cranial characters.—Skull like that of *S. beldingi* but rostrum more slender, ascending arms of premaxillæ narrower, palate longer behind molars, palatine bones shorter anteriorly, reaching only to plane of middle of 2d molars [in *beldingi* they reach plane of interspace between 1st and 2d molars].

Measurements.—Type specimen: Total length 265; tail vertebræ 57; hind foot 42.

Spermophilus mollis stephensi subsp. nov.

Type from Queen Station, near head of Owens Valley, Nevada. No. $\frac{29492}{41567}$, ♂ ad., July 12, 1891. Collected by F. Stephens. Orig. No. 718. (Alt. about 6000 ft.)

Characters.—Similar to *S. mollis*, but in summer pelage head and neck to shoulders uniform pinkish buff [of Ridgway's Color Nomenclature].

Color.—Summer pelage: Entire head and neck and fore-back to shoulders uniform pinkish-buff, becoming yellowish-buff below; rest of back vinaceous-buff slightly mixed with brown; under parts and fore legs and feet buffy; hind feet soiled whitish; tail above and below buffy, grizzled with dark hairs and edged with buffy.

Cranial characters.—Skull like that of *mollis*, but braincase broader across mastoids; ascending arms of premaxillæ narrower and more pointed; tooth row shorter.

Measurements.—Type specimen: Total length 209; tail vertebræ 49; hind foot 32. Average of 9 specimens from Owens Valley, Calif.: Total length 212; tail vertebræ 50; hind foot 32.4.

Spermophilus mollis yakimensis subsp. nov.

Type from Mabton, Yakima Co., Washington. No. 89331, ♂ ad., U. S. Nat. Mus., Biological Survey Coll, July 16, 1897. Collected by Walter K. Fisher. Orig. No. 323.

Characters.—Similar to *S. mollis* in size and general appearance, but tail slightly shorter; color grayer and less buffy, but not so gray as *canus*. Nasal bones very much longer than in either *mollis* or *canus*.

Color.—Upper parts buffy-gray, finely grizzled with dusky; nose dull rusty fulvous; cheeks and sides of neck grayish, sometimes suffused with pale buffy-yellowish, but never approaching the strong buffy-ochraceous of *mollis;* under parts buffy; feet whitish; tail grizzled fulvous as in *mollis.*

Cranial characters.—Skull like that of *mollis* in size and general characters, but nasal bones much longer, passing backward considerably beyond premaxillæ and ending in a wedge-shaped point; audital bullæ more inflated below plane of meatus (*i. e.*, less flattened); basioccipital slightly broader; incisors heavier.

Measurements.—Type specimen: Total length 215; tail vertebræ 48; hind foot 33. Average of 10 specimens from type locality and adjacent plain: Total length 213; tail vertebræ 46; hind foot 34.2.

Spermophilus mollis canus subsp. nov.

Type from Antelope, Wasco Co., Oregon. No. 78681, ♀ ad., U. S. Nat. Mus., Biological Survey Coll., June 21, 1896. Collected by Vernon Bailey. Original No. 5561.

Characters.—Similar to *S. mollis*, but grayer, slightly smaller, with shorter hind feet and decidedly shorter tail; skull smaller and relatively broader, with much shorter rostrum.

Color.—Upper parts finely grizzled gray and dusky without buffy suffusion; nose dull rusty fulvous; cheeks and sides of neck grayish (not buffy-ochraceous as in *mollis*); thighs dark, with a dull fulvous suffusion very different from the pale buffy-ochraceous of *mollis;* under parts buffy or buffy-gray, more or less grizzled with dark hairs on breast and middle of belly; feet soiled whitish; tail grayer and less fulvous than in *mollis*. Young similar to young of *mollis*, but decidedly darker; head and neck pale dull-fulvous instead of buffy-ochraceous; tail strikingly shorter and darker.

Cranial characters.—Skull similar to that of *mollis*, but shorter and relatively broader; rostrum conspicuously shorter; molariform teeth smaller (tooth row 1 mm. shorter); nasals shorter but variable, usually ending behind plane of premaxillæ.

Measurements.—Type specimen: Total length 198; tail vertebræ 38; hind foot 30. Average of 3 specimens from type locality: Total length 194.3; tail vertebræ 40; hind foot 30.3.

Spermophilus tridecemlineatus alleni * subsp. nov.

Type from Bighorn Mts., Wyoming. No. 56050, ♂, U. S. Nat. Mus., Biological Survey Coll., Sept. 18, 1893. Collected by Vernon Bailey. Original No. 4383.

Characters.—Size small (nearly as small as *parvus*); ground color of upper parts fully as dark as in typical *tridecemlineatus;* light spots in dorsal rows relatively larger and tail darker and much less reddish than in *tridecemlineatus.*

Cranial characters.—Skull and teeth similar to those of *parvus* (perhaps very slightly larger), but audital bullæ very much smaller.

Measurements.—Type specimen: Total length 211; tail vertebræ 74; hind foot 32.

Spermophilus tridecemlineatus texensis subsp. nov.

Type from Gainesville, Cooke Co., Texas. No. $\frac{2117}{2647}$, ♂ ad., Merriam collection, April 15, 1886. Collected by G. H. Ragsdale.

Characters.—Similar to *S. tridecemlineatus*, but smaller; ground color of upper parts, including base of tail, redder; middle stripe of under side of tail uniform deep reddish, not grizzled with black; no yellowish-olive tinge in any pelage and less seasonal difference in color than in any of the other forms.

Color.—*Winter pelage:* Ground color of upper parts, including base of tail, rich deep ferruginous or rusty, slightly grizzled with black hairs; nose grayish, slightly grizzled with rusty; sides of neck, feet, and under parts buffy; head marblings, dorsal stripes and spots, chin and lips buffy-white; rusty under side of tail sometimes partly hidden by buffy tips. *Summer pelage:* Similar to winter pelage, but ground color duller and light stripes and spots more buffy.

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* In honor of Dr. J. A. Allen, who first defined and named the subgenus *Ictidomys* to which the *tridecemlineatus* group belongs, and to whom we are indebted for its two best marked members—*pallidus* and *parvus.*

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

DESCRIPTION OF A NEW RODENT OF THE GENUS *IDIURUS*.*

BY GERRIT S. MILLER, JR.

Among some African birds recently purchased by the United States National Museum were found a few mammal skins from Efulen, in the Cameroon district. Two of these are referable to the rodent genus described by Mr. Paul Matschie under the name *Idiurus*.† Although taken within seventy miles of Yaunde Station, the type locality of *Idiurus zenkeri*, these specimens are referable to a species quite distinct from the one represented by Mr. Matschie's unique type. The new form may be called:

Idiurus macrotis sp. nov.

Type No. 83625, United States National Museum, ♂ young adult, collected at Efulen, Cameroon district, West Africa, June 18, 1895, by G. L. Bates. Original No. 4.

General characters.—Much larger than *Idiurus zenkeri* Matschie; tail and ears relatively longer; color apparently darker; skull larger; bony palate narrower; second lower molar distinctly larger than first.

Fur and color.—Pelage formed of hairs of two kinds. Main body of fur composed of soft densely set hairs about 9 mm. in length. Interspersed with these are hairs about double as long and closely resembling those of the wrist and foot tufts. These hairs occur on the dorsal surface only, and are most numerous along the sides. Dorsal surface of membranes covered with fur somewhat less dense than that on body; extreme edges of membranes bare. Ventral surface of membranes very sparsely haired. Distribution of hair on tail and feet exactly as described in *I. zenkeri.*

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* Published by permission of the Secretary of the Smithsonian Institution.

† Sitzungs-Berichte Gesellschaft Naturforschender Freunde zu Berlin, 1894, p. 194.

Color above sepia, slightly grayer on posterior half of back, and darkening to nearly black on membranes. A faintly indicated dark stripe from base of ear to muzzle. This is perceptible in certain lights only. Throughout the body fur the hairs are dusky plumbeous to within about 1 mm. of tip. This darker color appears everywhere irregularly at the surface. Ventral surface pale yellowish wood brown, irregularly darkened by the plumbeous bases of the hairs. Hairs on under side of membranes very dark brown and with none of the silver gray appearance described in *I. zenkeri*. Dorsum of manus and pes with short, scattered, dark brown hairs. Fringe on wrist (fig. 15) and side of hind foot dark brown. Tail dark chestnut brown, slightly tinged with yellowish near base.

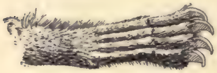

Fig. 15.—Front foot of *Idiurus macrotis*. (× 1⅛.)

Feet.—So far as can be determined from dry specimens, the feet are essentially as in *Idiurus zenkeri*. The front foot with its equal digits, rudimentary thumb, and fringed wrist is shown in figure 15.

Tail.—The generic characters of the tail, as described by Mr. Matschie in the type of *Idiurus zenkeri*, are exactly reproduced in *I. macrotis* (fig. 16). The pad of projecting scales occupies a space about 17 mm. in length and 4 mm. in width. The proximal end of the pad is about 25 mm. behind the anus. The lateral fringes begin on each side of the proximal end of the scale pad, but the ventral fringe reaches only to a point about 15 mm. behind the pad. The three fringes continue distinct to near the tip of the tail, where the hairs of which they are composed gradually become longer and finally blend with the long sparse hairs of the dorsal surface to form the terminal pencil. The hairs of all three fringes are about 4 mm. in length, those of the ventral fringe closely appressed. Long hairs on dorsal surface of tail 30–45 mm. in length.

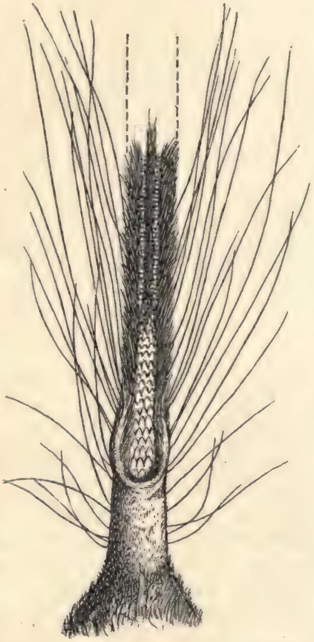

Fig. 16.—Base of tail (under side) of *Idiurus macrotis*. (× 1⅛.)

Ear.—The ears (fig. 17) are much larger than in *I. zenkeri* and wholly naked both within and without, except on the external basal third, which is covered with fur similar to that of the head. With a lens a few very small hairs may be detected on the anterior border, but these are invisible to the unaided eye. In form the ear is very simple and strongly suggestive of that of

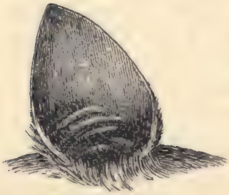

Fig. 17.—Ear of *Idiurus macrotis*. (× 1⅛.)

some of the smaller bats. Near the base of the auricle on the inner side are three well developed cross-ridges, and a fourth which is less distinct.

Skull.—The skull (fig. 18) is in general similar to that of *Idiurus zenkeri.* The bony palate, however, is at its widest point scarcely wider than the first molar, while at its narrowest point it is decidedly narrower than this tooth. In *I. zenkeri* the palate is about double as wide as the tooth row.* Surface of frontals slightly and evenly convex, with scarcely a trace of the six protuberances mentioned in the description of *I. zenkeri;* orbital edges knife-like and slightly overhanging. Incisive foramen a narrow slit, 1 mm. long and about one-third as wide.

Mandible very short and deep, the greatest depth contained only one and one-half times in greatest length. Coronoid process joined with articular process by a thick bridge, below which the bone is thin and semitransparent, but not fenestrate as in the type of *I. zenkeri.*†

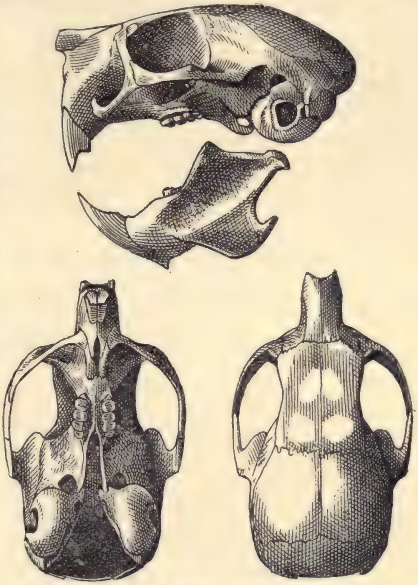

Fig. 18.—Skull of *Idiurus macrotis.* (× 1⅛).

Teeth.—Upper molar rows slightly convergent anteriorly. Combined length of three true molars equal to antero-posterior diameter of incisor. Premolar about three-fourths as large as first molar, which is the largest upper tooth. Second molar distinctly smaller than first and about twice as large as third. The crowns of the premolars and the first and second molars are each crossed by two ridges of enamel, isolating three narrow depressions, the posterior of which is so narrow as to be practically invisible to the unaided eye (fig. 19, *a*). Third molar with one ridge and two depressions in the type, two ridges and three depressions in an older specimen with very much worn teeth.

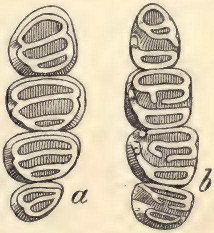

Fig. 19.—Teeth of *Idiurus macrotis;* *a* upper, *b* lower. (× 7½.)

First and second lower molars (fig. 19, *b.*) essentially equal in size, but second slightly the larger. Third molar considerably smaller than second and about equal to premolar. Enamel pattern essentially as in the maxillary teeth, but less regular.

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* "Gaumenbein fast doppelt so breit wie die Zahnreihe . . ."

† The fenestration in *I. zenkeri* may be due to injury during preparation of the specimen.

General remarks.—The type of *Idiurus zenkeri* is an old adult female ("ein sehr altes Weibchen"), while the two specimens of *I. macrotis* are males, one young adult, the other old. Yet the differences between the two forms are too great to be ascribed to sexual variation. That two or more species of a genus so peculiar as *Idiurus* should occur in the Cameroon district is not at all improbable. Neither can it be wondered at that animals so perfectly protected by color and form (the general appearance is well shown in Mr. Matschie's figure) should successfully escape notice, especially if, as is probably the case, they are strictly nocturnal in habits.

Measurements of Idiurus macrotis and I. zenkeri.

	I. zenkeri.	*I. macrotis.*	
Number	....	83625	83626
Sex	♀	♂	♂
Total length	....	241	228
Head and body	65	....	....
Tail vertebræ	100	133	123
Pencil	30	36	38
Hind foot	15	21	22
Ear: from meatus	12.5*	18	17
from crown	....	16	15.5
width	....	10.6	10
Skull: Basal length	17	....	....
Greatest length	22	26	27
Zygomatic breadth	13	15	16
Length of frontals	9	9.6	9.8
Least width of frontals	6	7	7
Length of nasals	5	7	7
Greatest breadth of nasals	3.25	3.25	3.3
Tip of nasals to gnathion	8.75	10	9.8
Incisor to premolar	6	6	6.8
Upper tooth row	2.8	3.8	4
Greatest distance between inner border of molars (m. 3)	....	2.2	2
Least distance between inner border of molars (m. 1)	2†	1.2	1.2
Width of first true molar	....	1.4	1.6
Mandible: Greatest length	11.5	15	16
Greatest depth	8	10	10.6
Lower tooth row	2.5	4	4

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* By 'Ohr' Mr. Matschie may mean ear from crown.

† "Entfernung der inneren Ränder der beiden Reihen."

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PROCEEDINGS

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THE EASTERN RACES OF THE AMERICAN VARYING HARE, WITH DESCRIPTION OF A NEW SUBSPECIES FROM NOVA SCOTIA.

BY OUTRAM BANGS.

The American Varying Hare (*Lepus americanus*), with its various forms, occupies the whole of the northern part of North America north to the limit of trees. It is distinctively an inhabitant of the cool, damp, coniferous forest, differing in this respect from its congeners that prefer more open and grassy country.

Its food consists principally of the young, tender shoots of conifers—spruce, fir, etc.—but it also eats the twigs and buds of the alder and other shrubs. In summer, grasses, reeds, and herbaceous plants form part of its diet; but even at this season the young branches and leaves of conifers are generally found in its stomach. Its flesh usually has a strong and, to me, unpleasant sprucy taste.

In eastern North America the Varying Hare may be divided into three geographical races:

1. *Lepus americanus americanus* Erxl., occupying Labrador.
2. *Lepus americanus virginianus* (Harlan), occupying the cool, damp forests and swamps of the Hudsonian, Canadian, and Transition zones. In the Alleghanies it extends south to Virginia and West Virginia.
3. *Lepus americanus struthopus* Bangs, occupying the peninsula of Nova Scotia.

In all three races a white pelage, which is more complete in northern than southern localities, is assumed at the approach of winter.*

The three eastern races are as follows:

Lepus americanus americanus (Erxleben).

Lepus americanus Erxl. Syst. Anim., p. 330, 1777.

Type locality.—Hudson Strait, south side.

Geographic distribution.—Labrador and perhaps the higher Hudsonian regions of central North America.

Subspecific characters.—Hind foot large; general color of upper parts (in summer pelage) shades of light yellowish brown and drab; a conspicuous white border to ear, all around, even in the young; skull short and broad, not deeply constricted behind postorbital processes; incisor teeth very slender and slightly projected outward.

Color.—Adult in summer pelage: upper parts varying individually from hair-brown and drab to tawny clay color, many black tipped hairs intermixed along back and on top of head; flanks, arms, pectoral band, and often lower sides, rather brighter, more tawny ochraceous; belly and chin to pectoral band dull white; ears dusky toward tips, bordered by a very conspicuous white band; legs and feet (sometimes hands also) dull white irregularly blotched by patches of tawny and ochraceous-buff; soles dusky, often stained, sometimes having an olivaceous cast. Young not essentially different, except that the legs and feet are not white, but pale tawny or ochraceous-buff. Winter pelage: pure white.

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* This peculiarity of not turning completely white in winter has been given as one of the principal characteristics of the southern race (*L. americanus virginianus*), but it does not seem a difference of any great importance and surely not one on which a subspecies could be based. The problem of how the winter coat is acquired has given rise to a good deal of discussion among naturalists, some taking the view that it is due to a change in the color of the hair itself, and others that it is brought about by a moult. Dr. J. A. Allen (Bull. Am. Mus. of Nat Hist., vol. VI, p. 107, 1894), who studied the question carefully and with considerable material, is firmly convinced that the latter view is the correct one. It seems to me that the bottom of the question has not yet been reached.

In spring the case is clear enough, and the change from the white winter to the brown summer dress is wholly due to a moult. The long white hairs fall out, leaving the animal clothed in a coat consisting mainly of the under fur, through which can be seen patches of the incoming brown hairs of summer. The case is not so clear in autumn. In late summer we find the adult hares in such short and worn pelage that in places the skin often shows through. When the cool weather of autumn comes and the hares stop breeding, a moult begins, in which the change is not to a white winter dress, but to a long full coat of brown, like that of summer. Before this moult is complete, however, the animal gradually begins to turn white. During this process many of the new hairs are white from the time they first appear, but what happens to the new brown hairs that have just been grown is a question. Does it seem that in the economy of nature these should again be shed before they have served their purpose? If hair and feathers can change color, as many suppose, does it not seem reasonable to assume that the American Varying Hare comes by his winter coat in two ways? Some hairs are white from the time they first appear. but others, which at first are brown, grow to their full length and then change to white.

Cranial characters.—Skull short and broad, not deeply constricted behind postorbital processes; nasals wide and flattened on upper surface; incisor teeth very slender and slightly projected outward.

The skull is difficult to tell from that of *L. virginianus*, except by its much more slender incisors, which in all I have examined have never failed to distinguish it.

Measurements.—Averages of nine fully adult specimens of both sexes from Hamilton Inlet (near Rigoulette), Labrador: Total length, 471.33; tail vertebræ, 34.22; hind foot, 146.77. (For individual measurements see table.)

Remarks.—Lepus americanus americanus has a more northern and I think a more restricted distribution than has usually been attributed to it. I have seen no specimens except from Labrador. However, it may occur around the shores of James Bay and thence westward into the interior. One specimen collected by Gerrit S. Miller, Jr., at North Bay, Ontario, is apparently an intergrade, though much nearer *virginianus*, since it has the broad incisor teeth and more constricted interorbital region characteristic of that subspecies. In color it is nearer true *americanus*, but the white border of the ears is not as pronounced as in that form. Specimens from Mt. Forest, Ontario, and Lake Edward, Quebec, are nearly alike and differ widely from true *americanus.* In March, 1893, Mr. Will C. Colt collected a series of varying hares for me at Osler, Saskatchewan. All of these specimens are in winter pelage. They are not true *americanus*, and perhaps represent still another race. They are small, with small skulls, having rather narrow nasals and very broad and strong incisor teeth. It thus appears that if true *americanus* finds its way far into the interior of the country, it must be restricted to the high Hudsonian regions near the limit of trees.

L. americanus americanus is very abundant throughout the wooded region of the Labrador peninsula.

I have a series of fourteen specimens collected near Rigoulette, Hamilton Inlet, in the summer of 1895, by C. H. Goldthwaite.

Lepus americanus virginianus (Harlan).

Lepus virginianus Harlan. Fauna Americana, p. 196, 1825.

Type locality.—Blue Mountains, Pennsylvania.

Geographic distribution. — Lower Hudsonian, whole of Canadian and much of Transition zones of eastern North America, except Nova Scotia. From Ontario, Quebec, and New Brunswick it ranges south on the coast to southern Massachusetts and northern Connecticut and formerly, perhaps, even to New Jersey; in the Alleghany Mountains to Virginia and West Virginia.

Subspecific characters. - Size of or slightly larger than *L. americanus americanus;* hind foot shorter; skull longer and more deeply constricted behind postorbital processes; incisor teeth much broader and more curved backward; general color of upper parts (in summer pelage) shades of rich reddish brown, russet, and dull ferruginous; white border of ear narrow and inconspicuous, often wanting.

Color.—Adult in summer pelage: upper parts varying individually from russet to dull, deep ferruginous, generally with a copious intermixture of black tipped hairs along back and on top of head; belly and chin white; pectoral band colored like back, but without black tipped hairs; ears without white border or with a narrow and inconspicuous one; legs, feet, hands, and arms seldom white, though sometimes irregularly blotched with white or buff. Young, similar to adults. Winter pelage: white, the under fur and some of the longer hairs often retaining part of their color throughout the winter, especially in more southern localities.

Cranial characters.—Skull longer and narrower than that of *L. americanus americanus;* more deeply constricted behind postorbital processes; nasals narrower, longer, and less flattened; incisor teeth broad and strong and more curved backward. The character of the incisor teeth will always serve to distinguish skulls of *L. americanus americanus* from those of *L. americanus virginianus.*

Measurements.—Average of nine fully adult specimens, males and females, from Maine, New Hampshire, and Massachusetts: total length, 475; tail vertebræ, 41.22; hind foot, 140.55 (for individual measurements see table).

General remarks.—*Lepus americanus virginianus* has an extensive distribution, being the form found over the greater part of the range of the species in eastern North America. In the southeastern part of its range, in Massachusetts and Connecticut where it was formerly very common, it is year by year becoming rarer and more local. In this region it is only found in cool, dark woods, extensive tracts of white cedar and white pine being its favorite home. Gradually but steadily, as spots suited to its needs become fewer and smaller, it is being replaced by its more progressive and adaptive cousin, the cotton-tail. Farther north, where the continuous forest of spruce and fir affords it an immense range, it still occurs in great abundance.

Unfortunately, I have seen no specimens from Pennsylvania, nor from the southern Alleghany Mountains. Mr. Thaddeus Surber writes me that it still occurs in the heavy hemlock and spruce forests of some of the higher mountains near White Sulphur Springs, West Virginia.

Lepus americanus virginianus varies but little in the large area it occupies. Specimens from New Brunswick are exactly like those from Massachusetts, and some of the most extreme and richly colored examples I have seen came from Mt. Forest, Ontario, and Lake Edward, Quebec. This is easily accounted for by the animal's peculiar requirements and mode of life, which are the same throughout its range. In Transition country it only occurs in deep, dark, moist woods, where the conditions are the same as those offered by a much more northern climate. That it has but a weak hold upon a place in the fauna of the Transition zone is shown by the rapidity with which it disappears when the conditions that enabled it to exist there are slightly changed.

I have specimens from Quebec, Ontario, New Brunswick, Maine, New Hampshire, and Massachusetts.

Lepus americanus struthopus subsp. nov.

Type from Digby, Nova Scotia. No. 2025, ♀ ad., coll. of E. A. and O. Bangs. Collected August 4, 1894, by Outram Bangs.

Geographic distribution.—Province of Nova Scotia.

Subspecific characters.—Size of *L. americanus virginianus;* hind foot much smaller; color (in summer pelage) darker and duller, rarely showing the reddish brown shades seen in *virginianus;* otherwise similar to *virginianus.*

Color.—Adult in summer pelage: Upper parts varying individually from raw umber to bistre, sometimes shaded about head, neck, and on flanks with dull ferruginous; black tipped hairs not numerous, often arranging themselves into a narrow dorsal stripe; belly and chin to pectoral band dull white; ears dark brown above, becoming dusky or black at tips, narrowly bordered by a yellowish brown band; hands and feet irregularly marked with dusky and sometimes with whitish blotches. Young similar to adults. Winter pelage, white.

Cranial characters.—The skull of *L. americanus struthopus* is in all essential characters like that of *L. americanus virginianus.* The audital bullæ are constantly a little smaller.

Measurements.—Average of nine fully adult specimens, males and females, from Nova Scotia: Total length, 474.77; tail vertebræ, 49.83; hind foot, 127.38. (For individual measurements see table.)

Remarks.—Lepus americanus struthopus is a peninsular form confined to the Province of Nova Scotia. It probably intergrades with *L. americanus virginianus*, though I have seen no specimens from that part of Nova Scotia adjoining New Brunswick. The principal character that distinguishes the Nova Scotia hare is its remarkably small hind foot. The color of the summer pelage is usually much darker and duller than in *L. americanus virginianus.* In my series of twelve in full summer pelage one specimen only is about the color of average specimens of *virginianus*, all the others being much darker. The dusky markings on feet, hands, nape, and top of head so common in *struthopus* are rarely, if ever, present in *virginianus.*

Lepus americanus struthopus is exceedingly abundant throughout the Province of Nova Scotia, except on the hard-wood ridges.

Within a few years this form has been introduced into Newfoundland, and finding there a region exactly suited to its needs, with no indigenous competitor, it has increased with great rapidity, so that now it is quite generally distributed throughout the southern part of the island. I am told that these hares were caught near Halifax. It will be interesting to watch their career in Newfoundland and see how long it will take the modifying influences of the new island home to work a change. If I might hazard a guess, this will be in the direction of still darker coloration.

Measurements of the eastern races of Lepus americanus (adult specimens).

Locality.	No.	Sex.	Total length.	Tail vertebræ.	Hind foot.
Lepus americanus americanus Erxl.					
Labrador, Hamilton Inlet	4152	♀	476	36	155
“ “ “	4153	♂	475	40	150
“ “ “	4160	♀	483	33	142
“ “ “	4164	♂	486	37	152
“ “ “	4154	♂	475	35	146
“ “ “	4156	♀	466	37	143
“ “ “	4161	♀	463	33	150
“ “ “	4155	♂	463	25	142
“ “ “	4163	♂	455	32	141
Lepus americanus virginianus (Harlan).					
Massachusetts, Middleboro	1730	♀	452	46	137
New Hampshire, Webster	5815	♂	465	44	141
“ “ “	5814	♂	505	44	146
Maine, Bucksport	4245	♀	462	46	131
Maine, Upton	4195	♂	475	35	140
Maine, Greenville	4963	♂	490	50	149
“ “	4967	♂	463	53	139
“ “	4966	♂	490	50	142
“ “	7273	♀	473	43	140
Ontario, Mt. Forest	1785	♂	485	47	147
“ “ “	1786	♂	457	46	133
Quebec, Lake Edward	3821	♂	481	44	153
“ “ “	3822	♀	482	49	143
Lepus americanus struthopus Bangs.					
Nova Scotia, James River	2028	♀	483	32	131
Nova Scotia, Digby	120	♀	511	50	137.5
“ “ “	121	♂	469	54	125.5
“ “ “	123	♂	461	48	129.5
“ “ “	124	♂	464	51	118
“ “ “	119	♂	479	54.5	125
“ “ “	122	♂	467	55	129
“ “ “ type	2025	♀	474	54	125
“ “ “	2026	♂	465	50	126

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PROCEEDINGS

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DESCRIPTION OF A NEW WHITE-FOOTED MOUSE FROM THE MOUNT BAKER RANGE, BRITISH COLUMBIA.

BY OUTRAM BANGS.

Several mice from the northwest belonging to the very distinct *austerus-canadensis* group of the genus *Peromyscus* have already been brought to notice. The subject of the present description is another that seems entitled to recognition. The group to which it belongs is a boreal one, and is distinguished from the *leucopus* group externally by a long hairy, sharply bicolored tail (as long or longer than the head and body), with decided pencil, and cranially by a broad flattened braincase and elongate slender rostrum. It probably has a transcontinental range and its members are all forest-dwellers.

The recognized forms are as follows:

Peromyscus austerus (Baird).
Coast lowlands and valleys of Washington and British Columbia; Transition Zone.

P. keeni (Rhoads).
Queen Charlotte Islands, B. C.

P. macrorhinus (Rhoads).
Skeena River, B. C.

P. sitkensis Merriam.
Sitka, Alaska.

P. oreas Bangs.
Cascade Mountains of Washington and southern British Columbia; Boreal Zone.

P. canadensis canadensis (Miller).
Cool, dark forests of Canadian and Transition Zones in eastern North America.

P. canadensis abietorum Bangs.
Hudsonian and upper Canadian Zones of eastern North America.

P. canadensis umbrinus Miller.
North shore of Lake Superior.

P. canadensis nubiterræ Rhoads.
Higher Alleghany Mountains of North Carolina, Tennessee, West Virginia, and northward to Pennsylvania.

Peromyscus oreas* sp. nov.

Type from Mt. Baker Range, 49th parallel, British Columbia. Altitude, 6500 ft. No. 3696, ♀ ad., coll. of E. A. and O. Bangs. Collected August 29, 1896, by Allan C. Brooks.

General characters.—Size medium (smaller than *P. macrorhinus*); color of upper parts rich reddish-brown; skull smaller and less exaggerated in character than that of *P. macrorhinus.*

Color.—Upper parts in adult, rich brown (varying from Prouts' brown to russets), slightly darkened along middle back by the admixture of black-tipped hairs, forming an indistinct darker dorsal stripe; orbital ring black, narrow, and inconspicuous; under parts dull white, the plumbeous under fur showing through; feet and hands white; ears large, dusky, in fresh pelage with narrow white edges; tail long, sharply bicolor, black above, white below, a long pencil at end. Younger individuals are somewhat darker and less reddish brown above.

Cranial characters.—The skull is smaller than that of *P. macrorhinus*, but has the flat, broad braincase and long slender rostrum peculiar to the group. These characters are rather less pronounced in *P. oreas* than in *P. macrorhinus.*

Measurements.—Type, ♀ ad.; total length, 200; tail vertebræ, 101; hind foot, 24. Topotype, No. 3694, ♂ ad.: total length, 207; tail vertebræ, 114; hind foot, 24.

Skull of type, ♀ ad.: basilar length of Hensel, 20.6; zygomatic breadth, 13.4; incisors to postpalatal notch, 10.8; length of nasals, 11.8.

Remarks.—*P. oreas* appears to be specifically distinct from *P. austerus*, the smaller and very much darker form of the adjacent lowlands.

Mr. Brooks took *P. austerus* at Sumas, B. C.; while in the high mountains of the Mount Baker range he got *P. oreas.* I have also a series of fifty specimens of *P. oreas* taken in the mountains above Hope, B. C., in 1894, by Will C. Colt. These are exactly like the Mount Baker examples, and it is therefore probable that *P. oreas* occupies all the higher mountains of northern Washington and southern British Columbia.

It is probable that *P. oreas* intergrades with *P. macrorhinus.* It is distinguished from that form by smaller size, more reddish brown color, and smaller skull, with the peculiar characters less exaggerated. With the enormous *P. sitkensis*, it needs no comparison, nor does it with *P. keeni*, the type of which I have examined and found to be quite close to *P. austerus.*

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* Oreas = a mountain nymph, Oread.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

DESCRIPTIONS OF ELEVEN NEW SPECIES AND SUBSPECIES OF VOLES.

BY VERNON BAILEY.

The following brief descriptions of new species and subspecies of *Microtus* are here published in advance of a more extended paper on the group, in which all the known American species are discussed. All of the new forms here described are in the Biological Survey Collection and the private collection of Dr. C. Hart Merriam, both in the U. S. National Museum.

Microtus dutcheri * sp. nov.

Type from Big Cottonwood Meadows, near Mt. Whitney, Calif. (10,000 ft. alt.). No $\frac{29769}{41848}$, ♂ ad., U. S. Nat. Mus., Biological Survey Coll. Collected July 10, 1891, by B. H. Dutcher. Orig. No. 69.

General characters.—Size rather small; tail short; ears small, nearly concealed by fur; colors dark above and below; lips (and usually nose) white; hip glands present in adult males.

Color.—*Summer pelage:* Above, dark bister with brown tips to the long hairs; below, dull cinnamon or buffy-brown; feet whitish or plumbeous-gray; tail bicolor, whitish below, brown or blackish above; lips and usually tip of nose white. *Winter pelage* unknown. *Young,* dull brown above and scarcely lighter below; feet and tail blackish; lips and nose usually white.

Cranial characters.—Skull similar to that of *M. montanus,* but differing in many details; rostrum slightly longer; bullæ smaller and less globular; lateral pits of palate shallower; dentition the same.

Measurements.—Type, ♂ ad.: Total length 167; tail vertebræ 35; hind foot 20. Average of 10 adult specimens from type locality: Total length

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* Named in honor of Dr. B. H. Dutcher, who collected the type series.

163; tail vertebræ 37; hind foot 20.6. *Skull of type:* Basal length 27.4; nasals 8; zygomatic breadth 16.7; mastoid breadth 12.2; alveolar length of upper molar series 6.5.

Microtus insularis sp. nov.

Type from Great Gull Island, New York, No. $\frac{4952}{5706}$, ♂ im., Merriam Coll. Collected Aug. 6, 1888, by B. H. Dutcher.

General characters.—Size of *pennsylvanicus;* colors darker; skull shorter and wider with spreading zygoma and deep prezygomatic notches.

Color.—August pelage: Above, dark yellowish bister heavily mixed with black hairs, darkest on nose and face; belly dusky, washed with cinnamon; feet blackish; tail black above, color of belly below.

Cranial characters.—The skull differs from that of *pennsylvanicus* in shorter, wider brain case; wider and more abruptly spreading zygomatic arches; broader zygomatic shield; smaller audital bullæ; palate short with a median point or spur and deep lateral pits. Posterior upper molar with second inner and outer angles approximately opposite and confluent; dentition otherwise similar to that of *pennsylvanicus.*

Measurements.—Type, measured from dry skin: Tail 29; hind foot 20. Skull, No. 43969, from Little Gull Island: Basal length 26; zygomatic breadth, 16.2; mastoid breadth 12.3; alveolar length of upper molar series 6.8.

Microtus angusticeps sp. nov.

Type from Crescent City, California. No. $\frac{17087}{24008}$, ♂ ad., U. S. Nat. Mus., Biological Survey Coll. Collected June 16, 1889, by T. S. Palmer. Orig. No. 151.

General characters.—Smaller and darker than typical *mordax,* with very narrow, slender skull and small audital bullæ.

Color.—Summer pelage: Upper parts dark bister, lined with black hairs, darkest on face and nose; sides paler; belly washed with creamy white; feet plumbeous-gray; tail distinctly bicolor, blackish above, soiled white below.

Cranial characters.—Skull small and very narrow, distinctly ridged in adults; nasals projecting in front of incisors; incisive foramina short; audital bullæ very small and constricted; coronoid notch of mandible narrow; incisors slender; molars small with narrow, sharp angles; enamel pattern as in *M. mordax.*

Measurements.—Type, ♂ ad.: Total length 170; tail vertebræ 56; hind foot 22. *Skull of type:* Basal length 23.4; nasals 7.6; zygomatic breadth 13.5; mastoid breadth 10.8; alveolar length of upper molar series 6.

Microtus nevadensis sp. nov.

Type from Ash Meadows, Nye Co., Nevada. No. $\frac{26877}{34291}$, ♀ ad., U. S. Nat. Mus., Biological Survey Coll. Collected March 2, 1891, by E. W. Nelson. Orig. No. 577.

General characters.—Size large; ears small; tail rather short; fur coarse and lax; colors dark; hip glands conspicuous in adult males. Skull massive and angular; incisive foramina narrow and closing to a point posteriorly.

Color.—March specimens: Above dark sepia or bister, much obscured by blackish hairs; sides lighter; belly smoky gray; feet dark gray; tail indistinctly bicolor, blackish above, gray or brownish below; lips usually white; tip of nose in adult usually whitish. Young with a blackish dorsal stripe and dusky feet and tail.

Cranial characters.—Skull heavy, angular, and much ridged; frontals high; rostrum bent downward; incisive foramina short, rather narrow and constricted to a point posteriorly; dentition heavy; upper incisors curved abruptly downward; first upper molar with 5 closed triangles; second with 4 triangles in 8 out of 16 specimens; in the other 8, with a slight inner lobe or loop at base of posterior triangle; third with anterior crescent, three closed triangles and a posterior loop with two inner lobes or horns.

Measurements.—Type specimen: Total length 210; tail vertebræ 55; hind foot 25.5. Average of 8 specimens from type locality: Total length 176; tail vertebræ 47; hind foot 23. *Skull of type:* Basal length 32; nasals 10.2; zygomatic breadth 19.3; mastoid breadth 14.3; alveolar length of upper molar series 8.

Microtus nevadensis rivularis subsp. nov.

Type from St. George, Utah, No. $\frac{5172}{5867}$, ♂ ad., Merriam Coll. Collected Jan. 6, 1889, by Vernon Bailey. Orig. No. 493.

General characters.—Smaller and lighter colored than its nearest relative, *M. nevadensis;* skull less rigid and angular; bullæ larger; incisive foramina longer and narrower; ears small, nearly concealed by fur.

Color.—Winter pelage: Upper parts dull bister, darkened with blackish tipped hairs (similar to *californicus*); sides scarcely paler; belly washed with whitish; feet dull grayish; tail bicolor, grayish below, blackish above. Young darker than adults, but not black backed.

Cranial characters.—Skull smaller and slenderer than skulls of *nevadensis* of equal age; audital bullæ much larger and fuller; anterior end of basioccipital narrower; incisive foramina narrower and actually as well as relatively longer; angular process of lower jaw longer and slenderer; incisors much slenderer; molar pattern essentially the same.

Measurements.—Type: Total length 179; tail vertebræ 48; hind foot 23. *Skull of type:* Basal length 28.2; nasals 8.3; zygomatic breadth 17; mastoid breadth 13.3; alveolar length of upper molar series 7.3.

Microtus nanus canescens subsp. nov.

Type from Conconully, Washington. No. 90577, ♂ ad., U. S. Nat. Mus., Biological Survey Coll. Collected Sept. 12, 1897, by J. Alden Loring. Orig. No. 4654.

General characters.—Like *nanus* but paler, clearer gray; skull with larger bullæ and greater mastoid breadth; zygomatic arches less widely spreading; upper incisors bent more abruptly downward. Hip glands conspicuous in adult males.

Color.—Summer pelage: Above, clear dark grayish, formed by pale buffy and black tipped hairs; sides shading to lighter gray and belly to white; feet dark gray; tail bicolor, grayish below; blackish above.

Cranial characters.—Skull slightly narrower and more elongate than in *nanus;* interparietal averaging longer; bullæ decidedly larger and fuller; mastoid breadth relatively greater; incisors scarcely reaching beyond nasals; molar pattern as in *nanus.*

Measurements.—Type: Total length 149; tail vertebræ 42; hind foot 20. *Skull of type:* Occipital condyle to anterior base of molars 17.4; posterior tip of nasals to foramen magnum 19.2; zygomatic breadth 15; mastoid breadth 12.3; alveolar length of upper molar series 6.3.

Microtus montanus arizonensis subsp. nov.

Type from Springerville, Arizona. No. $\frac{24778}{32179}$, ♂ ad., U. S. Nat. Mus., Biological Survey Coll. Collected Nov. 7, 1890, by E. W. Nelson. Orig. No. 153.

General characters.—Similar to *M. montanus,* but brighter and more ferruginous; lateral pits of palate shallower.

Color.—October and November pelage: Above, yellowish or rusty brown; belly washed with white; feet dark grayish; tail bicolor, grayish below; blackish above; lips whitish. Slightly immature specimens are a little duller in color than adults.

Cranial characters.—Skull very similar to that of *montanus,* but easily distinguished by the flatter palate with shallower lateral pits, and by thicker pterygoids; condyloid process of mandible slightly shorter; dentition not different.

Measurements.—Type: Total length 184; tail vertebræ 55; hind foot 20. Average of 7 specimens from type locality: Total length 158; tail vertebræ 41; hind foot 20.6. *Skull of type:* Basal length 27.3; nasals 8; zygomatic breadth 16; mastoid breadth 12.2; alveolar length of upper molar series 6.5.

Microtus pennsylvanicus labradorius subsp. nov.

Type from Ft. Chimo, Ungava, Labrador. No. $\frac{5481}{6566}$, ♀ ad., Merriam Coll. Collected Nov. 15, 1882, by L. M. Turner.

General characters.—Size and proportions approximately as in *Microtus drummondi.* Skull flatter with much smaller audital bullæ and more protruding upper incisors.

Color.—(Much changed by alcohol): Above, dark brownish; belly whitish; tail bicolor; feet pale.

Cranial characters.—Skull flattened, not much ridged or angled; postorbital ridge prominent; nasals short, cuneate, and scarcely reaching base of incisors; audital bullæ small; incisive foramina short; first upper molar usually with a posterior lobe on inner side; molar pattern otherwise as in *pennsylvanicus.* The skull is readily distinguishable from either *drummondi* or *fontigenus* by the protruding incisors and small audital bullæ.

Measurements.—Type, ♀ ad., measured from alcohol: Total length 139; tail vertebræ 39; hind foot 20. Average of 7 specimens from type locality, measured from alcohol: Total length 137; tail vertebræ 37; hind foot 19. *Skull of type:* Basal length 24.3; nasals 6.7; zygomatic breadth 14.4; mastoid breadth 11; alveolar length of upper molar series 6.2.

Microtus californicus vallicola subsp. nov.

Type from Lone Pine, Inyo Co., California. No. $\frac{25393}{32806}$, ♀ ad., U. S. Nat. Mus., Biological Survey Coll. Collected Dec. 23, 1890, by E. W. Nelson. Orig. No. 149.

General characters.—Similar to *M. californicus* but averaging slightly larger and darker; proportions the same.

Color.—Summer pelage: Upper parts dull sepia, darkened by black tipped hairs—darker and with less yellowish suffusion than in *californicus;* below dull grayish or smoky plumbeous; feet dusky; tail bicolor, grayish below; blackish above. *Winter pelage:* darker throughout, with black hairs of back longer and more conspicuous.

Cranial characters.—Skull like that of *californicus,* but audital bullæ usually smaller; occiput more abruptly truncate; nasals reaching nearer to tips of premaxillæ; middle upper molar with lobe at base of 4th triangle often developed into a loop.

Measurements.—Type, ♀ ad.: Total length 200; tail vertebræ 57; hind foot 23. Average of 7 specimens from type locality: Total length 188; tail vertebræ 56; hind foot 23. *Skull of type:* Basal length, 29.4; nasals 9.5; zygomatic breadth 17.6; mastoid breadth 13.4; alveolar length of upper molar series 7.4.

Microtus pinetorum nemoralis subsp. nov.

Type from Stilwell (Boston Mts.), Indian Territory, No. 87246, ♀ ad., U. S. Nat. Museum, Biological Survey Coll. Collected April 7, 1897, by J. Alden Loring. Orig. No. 3905.

General characters.—Size, largest of the subgenus *Pitymys* in the United States; ears large; fur long and coarse; colors duller than in *pinetorum,* but not so dark as in *scalopsoides.*

Color.—Upper parts dull chestnut, slightly lined with blackish tipped hairs on back and rump, becoming paler on sides; belly washed with cinnamon rufous over the plumbeous underfur; tail indistinctly bicolor, agreeing with dorsal and ventral colors of body; feet thinly clothed with pale buffy or sometimes dusky hairs.

Cranial characters.—Skull large and relatively elongated; supraoccipital sloping; interparietal narrow; mastoids and audital bullæ large and projecting farther back than in *pinetorum;* palate often with a posterior point projecting into the U-shaped interpterygoid fossa; molar series long; third upper molar with three tightly closed triangles and an irregular posterior loop; first lower molar with opposite reëntrant angles meeting behind the anterior loop.

Measurements.—Type specimen: Total length 130; tail vertebræ 24; hind foot 18. Average of five females and five males from type locality: Total length 135; tail vertebræ 25; hind foot 18.1. *Skull of type:* Basal length 25.3; nasals 7.7; zygomatic breadth 16.5; mastoid breadth 13.4; alveolar length of upper molar series 7.

Microtus pinetorum auricularis subsp. nov.

Type from Washington, Miss., No. $\frac{34062}{46139}$, ♂ ad., U. S. Nat. Mus., Biological Survey Coll. Collected May 26, 1892, by Vernon Bailey. Orig. No. 3649.

General characters.—Size small, about equalling *pinetorum;* ears very large for a *Pitymys* and conspicuous above fur; colors dark and rich; fur short and dense like that of *pinetorum.*

Color.—Upper parts dark rich chestnut darkened by dusky tipped hairs; under parts washed with paler chestnut over dark under fur; projecting tip of ear with scattered dusky hairs; tail not bicolor, scarcely darker above, like the back or slightly darker; feet dull brownish.

Cranial characters.—Skull like that of *pinetorum* in general form and characters, but interpterygoid fossa normally U-shaped instead of V-shaped; third upper molar with three closed triangles; first lower molar with first pair of reëntrant angles meeting behind anterior loop.

Measurement.—Type: Total length 120; tail vertebræ 22; hind foot 16. *Skull of type:* Basal length 22.3; nasals 7; zygomatic breadth 15.2; mastoid breadth 12.3; alveolar length of molar series 6.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

A NEW RACCOON FROM NASSAU ISLAND, BAHAMAS.

BY OUTRAM BANGS.

The announcement lately made by Mr. Oldfield Thomas* of the existence of two distinct species of indigenous Muridæ in the West Indies, *Oryzomys antillarum*, of Jamaica, and *O. victus*, of St. Vincent, has somewhat changed our ideas of the mammalian fauna of these islands. Mr. C. J. Maynard has, moreover, known for many years that a raccoon was abundant on Nassau Island.

Before Mr. Maynard started on his last trip to the Bahamas I begged him to get specimens of this raccoon. But his time was so occupied in collecting other objects of natural history, in which he was more interested, that it is doubtful if he would have secured one at all if just before he started for home some negroes had not brought him a female that they had caught alive. Mr. Maynard brought her home alive, and on the voyage she gave birth to one young, also a female. The two are now alive and well at Mr. Maynard's place in Newton, Mass., where I went last summer to see them. I was at once struck by the small size of these raccoons, and got Mr. Maynard to write to his friend, Mr. Herbert L. Claridge, at Nassau, to get me a specimen. In due course Mr. Claridge sent me one, a young male, unfortunately with the back part of the skull smashed. The small size of this specimen, together with the peculiarities of the unbroken part of the skull, are sufficient to distinguish the animal as a distinct island form.

There is no tradition among the inhabitants of Nassau that the raccoon was ever introduced upon the island, and I am unable to say from what continental stock it was derived.

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*Ann. and Mag. Nat. Hist., ser. 7, vol. I, Feb., 1898, p. 176.

The raccoon is abundant upon Nassau, but Mr. Maynard believes that it does not exist upon any of the other islands of the Bahama group.

The Nassau raccoon may well bear the name of its discoverer, who has done, and is doing, so much work on the Bahamas.

Procyon maynardi sp. nov.

Type from Nassau Island, Bahamas. No. 7750, ♂ young, coll. of E. A. and O. Bangs. Collected in August, 1897, by Herbert L. Claridge.

Specific characters.—Size small; hind foot small; colors and markings as usual; shoulder patch not so intensely colored and more overlaid by black hairs than in the Florida form (*P. lotor elucus*). Skull small; palatine extension very short and narrow; upper carnassial and molar teeth small and less square than in *P. lotor*, especially on the inner sides, which are much less truncate and more pointed.

Cranial characters.—The skull of the type and only specimen, a young male with the second teeth fully developed but unworn, consists of the forward parts of the skull only; the back from behind the nasals and behind the palatine extension is missing. Compared with skulls of *P. lotor* of the same age, it is smaller; palate narrower; palatine extension much shorter and narrower; malar slender and weak; infraorbital foramen large. The best character is the short narrow palatine extension. Probably a more perfect skull would show other characters.

Dental characters.—The teeth of *P. maynardi* are small and the upper carnassial and molar teeth quite differently shaped from those of *P. lotor*. They are shorter and broader—*i. e.*, much less square. The inside edges of these teeth in *P. lotor* are truncate, in *P. maynardi* they slope off from front and back into a rounding point, the last molar showing this peculiarity most strongly.

Measurements.—The type, ♂ young (from dried skin, apparently a little shrunken): Total length, 623; tail vertebræ, 210; hind foot, 96. Skull: length of nasals, 28.6; length of palate, 58.2; width of palate at middle of carnassial tooth, 17.2; length of palatine extension from a line across alveoli of last upper molars to end of pterygoid process, 23.8; to end of palate, 12.6; least width of palatine extension, 13.6; length of single half of mandible, 72.2.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

DESCRIPTION OF A NEW FOX FROM SANTA MARTA, COLOMBIA.

BY OUTRAM BANGS.

Among a small lot of mammals just received from Wilmot W. Brown, Jr., who is making collections in the Santa Marta Mountains, Colombia, for the Bangs collection, are two examples of an interesting new fox, which may be known as—

Urocyon aquilus* sp. nov.

Type from Santa Marta Mountains, Colombia, altitude between 2000 and 3000 feet, ♂ old adult, No. 8001, coll. of E. A. and O. Bangs. Collected Feb. 10, 1898, by W. W. Brown, Jr. Orig. No. 58.

Specific characters.—Similar in general external appearance to *U. cinereoargenteus*; colors dark, black the predominating color of upper parts, dull ochraceous buff of under parts; size small; tail short; skull large and massive, differing much from that of the North American gray foxes (true *Urocyon*).

Color and pelage.—Upper parts: Pelage short, hispid, the hairs banded, mostly with four distinct rings—wood-brown at base, then black, then wood-brown and black tipped, the black tips deeper along back from behind ears to base of tail, shorter and less conspicuous on sides and top of head, the black predominating on dorsal region and mixed black and dull brownish on sides; under fur mouse-gray at base, yellowish at tips; sides of neck behind ears tawny, under parts dull ochraceous buff with a decided vinaceous tint on lower belly, at base of tail and between arms; chin grizzled black; toes and fingers dull brownish black; ears brownish black, dull tawny around edges, nearly naked inside; tail very short, narrow, not bushy, black above and at tip, dull clay color below.

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*Aquilus = dark-colored.

Cranial characters.—The skull of *U. aquilus* is large (very large for the size of the animal) and massive; the region enclosed between the temporal ridges is narrow and the ridges themselves less strongly marked than in *U. cinereoargenteus;* no depression between postorbital process and frontal, the frontals being evenly rounded; postorbital processes small; zygomatic arch heavy and very low and straight, the malar very low down, leaving little space between it and molar teeth; palate broad; audital bullæ short, deep, and round (very differently shaped from those of *U. cinereoargenteus*); mandible like that of *U. cinereoargenteus*, with the peculiar narrow, straight, tapering rami, except that the notch at posterior end of lower side of ramus is not so strongly marked.

The dentition, though heavy throughout, is normal.

Measurements.

No.	Sex.	Total length.	Tail vert.	Hind foot.	Ear from notch.
8001, type....................	♂ old ad.	900	300	120	60
8002, topotype....................	♀ yg. ad.	860	290	125	65

Skull (type, ♂ old adult): Basal length, 122; zygomatic breadth, 74.6; mastoid breadth, 48; breadth across postorbital processes, 42; breadth of palate at middle of last molar, 22.8; length of palate, 63.6; greatest length of single half of mandible, 104.

Remarks.—Among South American *Canidæ* there appears to be a wide variety of type forms that probably completely bridge over the differences between *Urocyon* and the fox-like wolves of the subgenus *Thous.* Such species as *Canis azaræ, C. fulvipes,* and *C. urostictus* appear to be connecting links, showing a strange mixture of characters.

I can find no notice of any species like the subject of the present description. While *U. aquilus* undoubtedly belongs in the genus *Urocyon*, it differs cranially very much from *U. cinereoargenteus*, the type of the genus. Its external characters are wholly those of *Urocyon.*

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

A NEW MURINE OPOSSUM FROM MARGARITA ISLAND.

BY OUTRAM BANGS.

While on the Island of Margarita, Venezuela, in the summer of 1895, Lieutenant Wirt Robinson, U. S. Army, collected five murine opossums. Four of these he presented to the National Museum at Washington and one to me. These specimens represent a very pallid insular race that may be known as—

Marmosa robinsoni sp. nov.

Type from Margarita Island, Venezuela, ♂ adult, No. 7749, coll. of E. A. and O. Bangs. Collected July 12, 1895, by Lieut. Wirt Robinson, U. S. Army. Orig. No. 506.

General characters.—Similar to *M. murina*, but much paler and more yellow; black mark through eye less extensive; ear (in dried skins) considerably smaller; skull similar to that of *M. murina.*

Color.—Upper parts, clay color, becoming paler and more yellowish on sides; sides of neck and top of nose back to between eyes dull buffy yellow; black mark through eye less extensive and duller than in *M. murina.* Under parts, dull straw yellow to base of hairs; line of demarkation between colors of upper and under parts much less distinct than in *M. murina;* feet and hands dull yellowish white.

Measurements.

Number.	Sex.	Total length.	Tail vertebrate.	Hind foot.
7749*..................	♂ adult	374.9	203	
63209†................	♂ adult	370.8	210.8	24.13
63210..................	♀ adult	320	175.3	

*Coll. of E. A. and O. Bangs.

†Coll. of National Museum, Washington.

Remarks.—This insular murine opossum, which I have named in honor of its discoverer. may be readily distinguished from *M. murina* by its much paler, more yellow color and smaller ear. With *M. murina mexicana*, *M. robinsoni* agrees in having the middle of the face back to the eyes decidedly paler than the rest of the upper parts and in having small ears. It differs from *M. mexicana* quite as much in color as it does from true *murina*, and can be told at a glance from either.

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PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

A NEW RABBIT FROM MARGARITA ISLAND, VENEZUELA.*

BY GERRIT S. MILLER, JR.

The small collection of mammals taken on Margarita Island, Venezuela, by Lieut. Wirt Robinson during the summer of 1895 proves to be exceptionally rich in novelties. Of the six species that it contains, two † have already been described in these Proceedings as new, while I now find that a third, the rabbit previously recorded as *Lepus brasiliensis*, differs specifically from its mainland representative. It may stand as:

Lepus margaritæ sp. nov.

Lepus brasiliensis Robinson, Proc. U. S. National Museum, XVIII, p. 651.

Type No. 63217, United States National Museum, ♂ adult, collected on Margarita Island, Venezuela, July 1, 1895, by Lieut. Wirt Robinson, U. S. Army. Original number 369.

General characters.—In size, cranial characters, and general appearance most like *Lepus cumanicus* Thomas ‡ of the adjacent mainland, but with under side of tail dull yellowish brown instead of white, rump strongly suffused with rufous, and sides of head without conspicuous black spot between eye and base of ear.

Color.—General color of back and sides a conspicuous grizzle of blackish brown and pale whitish buff, the buff slightly paler on sides, and the black somewhat heavier on back. Soft, woolly under fur light plumbeous. Shoulders, rump, upper surface of tail and outer sides of all four legs strongly suffused with rufous. Nape patch clear rufous. Crown essentially like back, only more finely grizzled and the buff darker. Whole side of head light gray, shaded with dark brown, the gray clearer around eye (where it forms an indistinct ring) and on sides of muzzle, the brown most conspicuous on cheeks below and behind eye. Whole under parts, with the exception of a broad buffy collar, dull white, faintly darkened by the plumbeous bases of the hairs. The white extends on inner side of front legs to wrists and on hind legs to base of claws. Tail colored like the rump, slightly paler and less rufous ventrally than dorsally.

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* Published by permission of the Secretary of the Smithsonian Institution.

† *Rhogeëssa minutilla* Miller, and *Marmosa robinsoni* Bangs.

‡ Ann. and Mag. Nat. Hist., 6th ser., XX, p. 552, December, 1897.

Measurements.—Total length (skin), 350; length to end of outstretched hind feet, 445; * tail to end of hairs, 35.6; * hind foot, 86; ear from crown, 70; width of ear, 38. Skull: greatest length, 79; basilar length, 61; zygomatic breadth, 36.4; nasals, length 36.8; combined width, 18; incisive foramen, 12.4 x 7.4; maxillary tooth row (alveoli), 15; mandible, 58; mandibular tooth row (alveoli), 15.

General remarks.—Were it not for its longer ears, slightly smaller size, and short, dark colored tail, *Lepus margaritæ* would bear a very strong superficial resemblance to *L. sylvaticus transitionalis* Bangs. Its relationships, however, are, as already pointed out, with its nearest geographical ally, *L. cumanicus.*

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* From fresh specimen by collector.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

THE EARLIEST GENERIC NAME FOR THE NORTH AMERICAN DEER, WITH DESCRIPTIONS OF FIVE NEW SPECIES AND SUBSPECIES.

BY C. HART MERRIAM.

For many years the generic name *Cariacus* Lesson, 1842, stood unchallenged for our Virginia Deer and its allies. In February, 1895, Mr. Oldfield Thomas reinstated Gloger's *Dorcelaphus*, as having one year priority, but stated that it was by no means clear that this name would stand, since it was antedated, he was informed by Dr. T. S. Palmer, by two of Rafinesque's names—*Panallodon*, 1831, and *Odocoileus*, 1832. I have not been able to see a copy of the rare publication in which Rafinesque's *Panallodon* appeared. It is entitled 'Enumeration and Account of some remarkable natural objects of the Cabinet of Professor Rafinesque, in Philadelphia,' and is said to have been published in Philadelphia in November, 1831. In a review in 'The Monthly American Journal of Geology and Natural Science' for May, 1832 (Vol. I, No. 11, pp. 509–510), it is said that *Panallodon* "owes its existence to a jawbone, six inches long, found in a Solar temple in Kentucky. He [Rafinesque] thinks this akin to mazama, which was somewhat similar to the antelopes, but having teeth 'more like some carnivorous animals, but no canine tooth.'" Apart from the insufficiency of the diagnosis, the small size of the jaw and character of the teeth indicate that the animal could not have been a deer.

Rejecting *Panallodon* as untenable, the name next in order of date is *Odocoileus.*[*] This name was based on the second or third (probably the third) left upper premolar of the Virginia deer, or a closely related form, found in a cave near Carlisle, Pennsylvania. Fortunately there is no room for doubt as to the animal to which the tooth belonged, for Rafinesque described it in detail and published natural-size figures of both outer and inner faces of the tooth. Since the name *Odocoileus* was published 9 years earlier than *Dorcelaphus* of Gloger, and 10 years earlier than *Cariacus* Lesson, it appears to be the earliest generic name for the American deer of which *O. speleus* Raf. [= *O. virginianus* (Bodd.)] is the type species. The earliest generic name for the South American deer of the group typified by *Cervus rufus* I have previously shown to be *Mazama* Rafinesque, 1817.[†]

Five new deer in the collection of the Biological Survey are here described: Two of these, one from Sitka, Alaska, the other from southern California, are northern and southern representatives of the Columbia Blacktail (*Odocoileus columbianus*), to which they are closely related; the third, from Cerros Island, Mexico, is a strongly marked insular species of the Mule Deer group, of which *Odocoilcus hemionus* is the type. The remaining two, from southern Mexico, appear to be very distinct.

Odocoileus columbianus sitkensis subsp. nov.

Type from Sitka, Alaska, No. 74383, ♀ im., U. S. Nat. Mus., Biological Survey Coll. Collected Aug. 8, 1895, by C. P. Streator. Original No. 4767.

Characters.—Similar to *O. columbianus*, but smaller, with smaller skull and teeth, and much shorter ears (in type: from anterior base 125; from notch 105); black of upper side of tail replaced on basal half with fulvous hairs, like those of back.

Color.—Type specimen at end of summer (with patches of gray winter coat coming in irregularly through worn red summer coat): upper parts from forehead to base of tail, including outer sides of legs and feet, fulvous; face grizzled gray, becoming pale dull fulvous inferiorly; eyelids black; a V-shaped mark extending from eyes half way to nose, dusky; space between eyes grizzled fulvous and black; ears grizzled gray and dusky, not becoming blackish anteriorly; inside of ears white. Chin and under lip, except bar between angles of mouth, white; posterior part of belly, inguinal region, inner side of thigh, and a disconnected strip along posterior aspect of foreleg, white; throat grayish fulvous; rest of under parts pale fulvous; tarsal gland blackish in middle, surrounded by fulvous. Tail: above, basal half fulvous like back; terminal half (except white tip) black; under side white, the white at tip showing from above.

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[*] Atlantic Journal, vol. I, No. 3, p. 109, "Autumn of 1832."

[†] Science, NS, I, 208, Feb. 22, 1895.

Cranial characters.—Skull similar to that of *columbianus*, but somewhat smaller; tooth row shorter; lachrymal pit short and very deep; anteorbital vacuity relatively small.

Odocoileus columbianus scaphiotus subsp. nov.

Type from Laguna Ranch, Gabilan Range, Calif., No. 65162, ♂ ad., U. S. Nat. Mus., Biological Survey Coll. Collected April 24, 1894, by J. E. McLellan. Orig. No. 797.

Characters.—Similar to *O. columbianus*, but ears very much larger; coloration paler.

Color.—Type specimen in worn winter pelage (April 24): upper parts uniform grizzled gray; under parts with white areas as in *columbianus;* ears longer and *very much broader* than those of *columbianus.*

Cranial characters.—Skull similar to that of *columbianus*, but lachrymal pit narrower and more elongate anteriorly; anteorbital vacuity much larger; teeth larger and heavier.

Measurements.—Type specimen (in flesh): Total length 1465; tail vertebræ 135; hind foot 452. Ear in dry skin: length from anterior base 178; from notch 168; breadth 106.

Odocoileus cerrosensis sp. nov.

Type from Cerros (or Cedros) Id. off Lower California, Mexico, No. 80782, ♂ ad., U. S. Nat. Mus., Biological Survey Coll. Collected August 9, 1896, by A. W. Anthony.

Characters.—Similar in general to the California Mule Deer, *Odocoileus hemionus californicus*, but smaller.

Color.—Upper parts dark grizzled gray with scattered hairs of pale fulvous; a blackish band along median line from occiput to rump and on upper surface of tail, usually but not always interrupted on rump; muzzle grayish-white, becoming gray on sides of face; a small dusky spot on top of nose close to nose pad, and another on each side just behind nostril; a dark transverse band between eyes anteriorly, curving back over eyes and reaching posteriorly to behind plane of eyes, thus forming a broadly U-shaped mark; ears grizzled gray with a darker area on anterior face just above middle; inside of ears white; under lip and chin whitish, with a small elongate black spot on each side of middle of lip, and a small dark triangle on middle of chin; throat and neck dark dusky gray, becoming blackish between forelegs and along middle of breast; sides of breast and belly grizzled gray like back; inguinal region and posterior third of middle of belly whitish, becoming buffy on thigh and reaching down on inner side of leg a little below heel; posterior aspect of forelegs and feet buffy; rest of legs and feet buffy fulvous. Tail: basal two-thirds whitish, usually with dark band above; terminal third abruptly blackish and enlarged, and with some fulvous hairs on upper side. Tarsal gland normal, on inner side of calcaneum; metatarsal gland about 75–80 mm. in length, occupying approximately middle third (really a little above middle third) of outer side of metatarsus.

Cranial characters.—Skull similar in general to that of *O. hemionus californicus* but smaller and lighter, with *decidedly longer nasals* and very *much smaller teeth.* The nasals are very narrow anteriorly, and are produced so far posteriorly as to reach within 3 or 4 mm. of plane of hinder border of anteorbital vacuities. The postero-lateral edge of the nasals abutting against the anteorbital vacuity is nearly straight and so elongated that its length equals the combined breadth of nasals on fronto-nasal suture. The lachrymal pit is deep, but less so than in *O. h. californicus.* The anteorbital vacuity is decidedly larger than in *californicus;* the orbitosphenoid decidedly narrower, and the anterior (sublachrymal) extension of the jugal equally broad. The external openings of both of the lachrymal ducts are on the inner side of the orbital rim.

Antlers.—The antlers are small, well bowed outward, with incurved tips, and have only a single branch which is given off from the upper third of the main tine and projects backward and upward. The largest antler of five apparently adult bucks in the collection measures only 190 mm. from burr to tip in a straight line; the spread between the tips is 230; greatest spread at base of incurved tips 260.

Measurements.—Type specimen, measured from dry skin: Total length 1560; tail vertebræ 180; hind foot 380; ear from crown anteriorly 180.

Odocoileus thomasi sp. nov.

Type from Huehuetan, Chiapas, Mexico, No. 77866, ♂ ad., U. S. Nat. Mus., Biological Survey Coll. Collected Feb. 22, 1896, by E. W. Nelson and E. A. Goldman. Orig. No. 9359.

Characters.—Size rather large; *color red all the year round;* tail as in the Virginia Deer; metatarsal gland a very small spot on postero-external aspect of metatarsus about midway between calcaneum and hoofs.

Color.—*Winter pelage* (type specimen): Upper parts including side of belly, middle of breast and neck all round, fulvous, becoming bright grizzled golden fulvous on back; muzzle grayish dusky; forehead mixed fulvous and black, becoming solid black in front of plane of ears, with a fulvous spot over each eye posteriorly; chin white with a black spot on each side of middle of lip, the spots nearly meeting on median line; inguinal region, inner side of thighs, middle part of belly, and posterior aspect of forelegs, white. Tail: upper surface bright fulvous; under surface white. *Summer pelage* (Tonala, Chiapas, Aug. 10): Similar, but upper parts simply fulvous, lacking the grizzled golden appearance of winter pelage; forehead fulvous like rest of upper parts (lacking the black of winter); muzzle dark grayish with a small dusky spot just behind nose pad and another behind each nostril. [It is possible that the Tonala specimen is not *O. thomasi.*]

Cranial characters.—Skull and teeth similar in general to those of *Cariacus clavatus* True [= *Odocoileus truei*] * from Honduras but somewhat larger, skull broader, nasals shorter, anteorbital vacuities larger; antlers larger (about 120 mm. long) and in one specimen (from Tonala, Chiapas) developing a short prong on inner side midway of the length of the tine.

The skull of an old buck (No. 74885), with mature antlers in the velvet, was collected by Mr. Nelson at Santa Efigenia, Oaxaca, July 21, 1895. The antlers are unlike those of any deer known to me, and I incline to the belief that they are those of *O. thomasi* when full grown. They measure 200 mm. in straight line from burr to tip and 240 over curve, and slope directly backward almost on plane of face, the tips curving inward and slightly forward (spread between tips 110; greatest spread 165). They give off a spike on inner side about 60 mm. from burr, which curves inward and forward (agreeing with curvature of beam) and reaches back about 110 from burr. These spikes are symmetrical on the two sides and their incurving tips are only 50 mm. apart. The left beam gives off posteriorly a prong 70 mm. below the tip and 50 mm. in length, which is directed backward and slightly inward. The burrs are very large and, with the basal part of the beams, very rugose. The skull bearing these antlers is somewhat smaller than the type of *thomasi*, and the rostrum and nasals are narrow, as usual in old age. The flesh measurements of this animal were: Total length 1400; tail vertebræ 165; hind foot 378; height at shoulder 780.

Measurements.—Type specimen: Total length 1544; tail vertebræ 153; hind foot 425.

Odocoileus nelsoni sp. nov.

Type from San Cristobal, highlands of Chiapas, Mexico. No. 76201, ♂ 2d year, U. S. Nat. Mus., Biological Survey Coll. Collected Oct. 1, 1895, by E. W. Nelson and E. A. Goldman. Orig. No. 8524.

Characters.—Size medium; color dark brownish gray, with top of head and dorsal band blackish; antlers (2d year) small sub-cylindrical spikes 65 mm. in length.

Color.—Upper parts dark grizzled brownish-gray, the tips of hair becoming pale fulvous posteriorly; a black stripe from nose pad to forehead, bifurcating and sending a narrow band over each eye in type specimen leaving top of head grizzled gray and black [in another specimen whole top of head blackish, the difference probably seasonal]; a blackish dorsal band from top of head to middle of back on rump; ears grizzled gray; tail like that of Virginia Deer; fulvous above, white below. A black band across white chin; sides of face and neck all round dark grizzled gray, becoming dusky between forelegs; axillary and inguinal regions, posterior aspect of forelegs and inner side of thigh white; sides of belly and legs pale grayish-fulvous. Metatarsal gland a small spot 10 mm. long surrounded by white hairs, on outer side of metatarsus midway between end of calcaneum and tip of hoof. Tarsal gland normal.

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* In 1888 Mr. F. W. True described a new deer from Honduras under the name *Cariacus clavatus.* But the specific name *clavatus* for a deer of this group is preoccupied by *Cervus clavatus* Ham. Smith (in Griffith's Cuvier, Animal Kingdom, V, 315, 1827). Hence it is necessary to rename Mr. True's deer, which I take pleasure in doing in honor of its describer. It may be known as *Odocoileus truei.*

Cranial characters.—Skull small and light with short nasals, small anteorbital vacuities, shallow lachrymal pits, broad anterior (sublachrymal) extension of jugals, broad orbitosphenoids, and remarkably small and narrow audital bullæ. The skull and teeth resemble those of *O. acapulcensis* more closely than they do any other deer known to me, but may be distinguished from *acapulcensis* by the shortness of the nasals, great breadth of the orbitosphenoid anteriorly and of the anterior extension of the jugal, and the small size of the audital bullæ.

Measurements.—Type specimen, ♂ of 2d year, not full grown; measured in flesh: Total length 1250; tail vertebræ 170; hind foot 360. Height at shoulder 650. Ear in dry skin: from anterior base 140; from notch 120.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

DESCRIPTIONS OF TWO NEW SUBGENERA AND THREE NEW SPECIES OF *MICROTUS* FROM MEXICO AND GUATEMALA.

BY C. HART MERRIAM.

Among the mammals collected in Mexico and Guatemala by Mr. E. W. Nelson and his assistant, Mr. E. A. Goldman, are 462 specimens of Voles of the genus *Microtus.* These animals were found on most of the mountains visited and series were obtained at 34 localities.

Up to the present time only three species of *Microtus* have been described from Mexico, namely, *mexicanus* (Saussure), from Mt. Orizaba, *phæus* (Merriam), from the Sierra Nevada de Colima, Jalisco, and *quasiater* (Coues), from Jalapa, Vera Cruz. *M. mexicanus* and *phæus* belong to the subgenus *Microtus; M. quasiater* to the subgenus *Pitymys.* Mr. Nelson's collection contains large series of topotypes of these three species, and additional specimens from numerous new localities; it contains also three new species, one of which (*fulviventer*) belongs to the subgenus *Microtus* proper; the others differ so widely from the previously known groups and from each other that it is necessary to erect two new subgenera for their reception. The two animals agree in the character of the fur, which is long and soft, and in the number of closed triangles on the first and last lower molars; they differ in the enamel pattern of the last upper molar, the degree of inflation of the triangles and loops of all the teeth, and in striking cranial characters. One is a long-tailed vole from Mt. Zempoaltepec, Oaxaca; the other a short-tailed animal from Todos Santos, Guatemala. Both localities are considerably farther south than the southernmost published record of any member of the genus.

Subgenus MICROTUS Schrank.

Type, *Microtus arvalis* (Pallas) from Europe.

Microtus fulviventer sp. nov.

Type from Cerro San Felipe, Oaxaca, Mexico (alt. 10200 ft.). No. 68250, ♂ ad., U. S. Nat. Mus., Biological Survey Coll. Collected Aug. 22, 1894, by E. W. Nelson and E. A. Goldman. Orig. No. 6601.

Characters.—Similar to *M. mexicanus* in size and general characters, but upper parts very much 'redder' and under parts fulvous instead of whitish; tail short; ears conspicuous.

Color.—Upper parts uniform dark umber brown mixed with black hairs; under parts dark fulvous or chestnut-fulvous; tail indistinctly bicolor, blackish above, pale fulvous below, darkening toward tip.

Cranial and dental characters.—Skull and teeth similar to those of *M. mexicanus*, but slightly larger; interorbital region broader; incisive foramina longer; molars heavier.

Measurements.—Type specimen: Total length 154; tail vertebræ 38; hind foot 20.

Subgenus ORTHRIOMYS * nobis.

Type, *Microtus umbrosus* sp. nov., from Mt. Zempoaltepec, Oaxaca, Mexico.

Characters.—Palate normal; interorbital constriction rather broad; $m_{\overline{1}}$ with 3 closed triangles (2 on inner and 1 on outer side) and 2 open triangles, the latter forming the wings of the anterior trefoil; $m_{\overline{3}}$ with 2 completely closed triangles (1 on each side) and 2 obliquely transverse loops (anterior and posterior) both on inner side; the outer triangle immediately followed by a deep reëntrant angle which completely cuts it off from inner triangle; $m^{\underline{3}}$ with 1 closed triangle on each side. Mammæ 4: pectoral $\frac{2}{2} = 4$. Fur long and soft, only extreme tip colored.

Remarks.—In the type and only known species, *M. umbrosus*, $m^{\underline{3}}$ has only 2 closed triangles and a posterior open trefoil; the molars are very broad and heavy, the breadth relatively greatest posteriorly; the enamel loops and triangles are very large, full, and broadly rounded, enclosing large islands of dark osteodentine, and so crowded as to exceed the interspaces. The crowns of the molars resemble those of *Phenacomys* in the polish of the enamel, darkness of the osteodentine and of the crowns as a whole (contrasted with the whitish molars of *Microtus*); large size and fullness of the loops and triangles (in this respect exceeding *Phenacomys*); pyriform shape of anterior loop in $m^{\underline{2}}$ and $m^{\underline{3}}$; enamel pattern of upper molars, including $m^{\underline{3}}$; only slightly modified enamel pattern of lower molars, and great breadth of molar series (above and below) posteriorly. They differ from those of *Phenacomys* in having the outer triangle of $m_{\overline{3}}$ completely isolated; two less triangles on m_1, less disparity in depth between the reëntrant angles of the two sides in the lower molars, and in the total absence of roots.

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* *ὄρθριος*, early; *μῦς*, mouse. In many respects *Orthriomys* suggests an ancient type intermediate between *Phenacomys* and the microtine subgenera *Pedomys* and *Arvicola;* in the character of its molar crowns it is nearest *Phenacomys.*

Microtus umbrosus sp. nov.

Type from Mt. Zempoaltepec, Oaxaca (alt. 8200 ft.). No. 68480, ♀ ad., U. S. Nat. Mus., Biological Survey Coll. Collected July 10, 1894, by E. W. Nelson and E. A. Goldman. Orig. No. 6412.

Characters.—Size medium or rather large; tail long and scantily haired; ears rather short and nearly concealed by fur; color very dark; fur long, soft, and full; dentition peculiar.

Color.—Upper parts uniform dusky with tips of hairs brown; under parts dark slate, washed with pale dull fulvous.

Cranial and dental characters.—Skull rather long; braincase long; anterior roots of zygomata not notched in front; zygomata not widely spreading, sides parallel; jugal not expanded; audital bullæ small; palatine pits deep; postpalatal notch square; interorbital constriction broad; premaxillæ reaching posteriorly considerably beyond nasals; nasals narrowing posteriorly; incisive foramina rather short. Molars large and broad; $m^{\underline{3}}$ with 1 closed triangle on each side, and a short posterior trefoil or v presenting one open salient angle on each side [remaining teeth described under subgenus].

Measurements.—Type specimen: Total length 184; tail vertebræ 65; hind foot 23. Average of 7 specimens from type locality: Total length 177; tail vertebræ 61; hind foot 23.5.

Subgenus HERPETOMYS * nobis.

Type, *Microtus guatemalensis* sp. nov., from Todos Santos, Guatemala.

Characters.—Palate normal; $m_{\overline{1}}$ with 3 closed triangles (2 on inner and 1 on outer side) and 2 open triangles, the latter forming the wings of the anterior trefoil; $m_{\overline{3}}$ with 2 completely closed triangles (1 on each side) and 2 obliquely transverse loops (anterior and posterior) both on inner side; $m^{\underline{3}}$ with 3 closed triangles (2 on outer and 1 on inner side) and a long posterior crescentic loop with both horns projecting on inner side. Mammæ 6: pectoral $\frac{2}{2}$, inguinal $\frac{1}{1}$ (the latter not functional). Plantar tubercles 5. Fur long and soft with only extreme tip colored.

Remarks.—This animal, while agreeing with *Orthriomys* in the number of enamel loops and triangles of the lower molars, differs strikingly in those of the last upper molar (which agrees with *Microtus* proper) and in the general appearance of the molar crowns, which resemble *Microtus* instead of *Phenacomys.*

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* *ἕρπης*, *ἕρππτος*, creeper; *μῦς*, mouse.

Microtus guatemalensis sp. nov.

Type from Todos Santos, Huehuetenango, Guatemala (alt. 10000 ft.). No. 76777, ♂ ad., U. S. Nat. Mus., Biological Survey Coll. Collected Dec. 30, 1895, by E. W. Nelson and E. A. Goldman. Orig. No. 8960.

Characters.—Size medium; coloration very dark; end of nose blackish; lips white; tail short and rather scantily haired; fur very long and soft, nearly hiding the ears.

Color.—Under parts everywhere slate black; extreme tips of hairs on upper parts mixed dark golden fulvous and black, the resulting color difficult to describe but near the 'mummy brown' of Ridgway's 'Nomenclature of Colors'; end of nose surrounding nose pad blackish; edges of lips white; tail concolor, blackish.

Cranial and dental characters.—General appearance of skull as in *Microtus pennsylvanicus* or *mexicanus* but less constricted interorbitally; audital bullæ very large and swollen; jugal rather broadly expanded vertically; incisive foramina very rectangular—of nearly equal breadth throughout and truncate at both ends; anterior root of zygoma rather strongly notched in front and standing out squarely so that the jugals are nearly parallel. Dentition peculiar: incisors broad and long; molars broad and heavy: m^3 with 2 completely closed triangles on outer and 1 on inner side, with open posterior loop elongated and curved to form 2 salient angles on inner side.

Measurements.—Type specimen: Total length 155; tail vertebræ 40; hind foot 21. Average of 20 specimens from type locality: Total length 150; tail vertebræ 37; hind foot 21.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

RANDOM NOTES ON THE NOMENCLATURE OF THE CHIROPTERA.

BY T. S. PALMER.

A careful examination of the names of bats now in common use shows that many changes must be made before the nomenclature will be placed on a stable basis. Some of these changes have already been pointed out by Miller in his recent revision of the Vespertilionidæ.* But errors no less glaring still pass current in other families, and it is the purpose of this paper to call attention to a few which have come to light while compiling a list of the family and generic names of Chiroptera.

Bats are now usually divided into six families: Emballonuridæ, Nycteridæ, Phyllostomatidæ, Pteropodidæ, Rhinolophidæ, and Vespertilionidæ. A rigid adherence to the rule of priority requires a change in at least two of these names, as well as in the designations of several subfamilies, genera, and species.

NOCTILIONIDÆ (Emballonuridæ).

The free-tailed bats received the commonly accepted name of Emballonuridæ from Dobson in 1875.† Gray, however, in 1821‡ proposed the term Noctilionidæ based on another genus of the same family, and this name having priority of more than half a century should be adopted instead of Emballonuridæ.

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*North American Fauna, No. 13, 1897; Ann. & Mag. Nat. Hist., 6th ser., XX, p. 379, 1897. Most of the references to generic and specific names were furnished Mr. Miller by the Biological Survey of the U. S. Dept. of Agriculture, the generic names forming part of my forthcoming index to the genera of mammals.

† Ann. & Mag. Nat. Hist., 4th ser., XVI, p. 347, Nov., 1875.

‡ London Medical Repository, XV, p. 299, Apr. 1, 1821.

The genus *Saccopteryx*, according to Dobson, contains 4 subgenera, one of which, *Centronycteris*, was based on *Vespertilio calcaratus* from Brazil. This species was named by Wied in 1821,* but is preoccupied by *Vespertilio calcaratus* Rafinesque † described in 1818, a North American species belonging to another family. Since the Brazilian bat now known as *Saccopteryx calcarata* does not seem to have received any other specific name, it may be called **Saccopteryx wiedi** in honor of its discoverer, Maximilian, Prince of Wied.

MEGADERMATIDÆ (Nycteridæ).

The family Nycteridæ, also named by Dobson in 1875, contains but two genera, *Megaderma* and *Nycteris*, each the type of a distinct subfamily. Harrison Allen published the name Megadermatidæ in 1864 ‡; Peters used the term Megadermata as early as 1865, and Gill adopted it in a modified form Megadermidæ, in 1872. Although Harrison Allen merely used the name incidentally for a genus which is now known to belong to another group, there can be no doubt as to the genus on which it was based. Consequently there seems to be no reason why Megadermatidæ should not be adopted for the family, since it has 11 years' priority over Nycteridæ.

PHYLLOSTOMATIDÆ.

Several changes in current generic names of leaf-nosed bats are also necessary. *Anoura* Gray, 1838, should replace *Glossonycteris* Peters, 1868, as recently shown by Thomas and Trouessart; *Phylloderma* may be antedated by *Guandira;* and *Lophostoma* must give way to *Tonatia.* The Cayenne Bat, called *Phylloderma stenops* by Peters in 1865,§ was previously named *Guandira cayanensis* by Gray in 1843, but apparently was not described until 1866 ||

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* Schinz, Das Thierreich, I, p. 180, 1821.

† Am. Monthly Mag., III, p. 445, Oct., 1818.

‡ Mon. Bats North Am., p. XXIII, 1864.

§ Monatsber. K. Preuss. Akad. Wiss., Berlin, p. 513, 1865.

|| List Spec. Mamm. Brit. Mus., p. 194, 1843; Proc. Zool. Soc. London, 1866, p. 114.

and therefore remained a nomen nudum until one year after the appearance of Peters' description. If Gray has anywhere described the species prior to 1866, his name *Guandira* will of course take precedence over *Phylloderma.*

Lophostoma D'Orbigny,[*] is antedated at least nine years by *Tonatia* Gray, 1827. *Lophostoma* was based on *L. sylvicolum* (= *Phyllostoma amblyotis* Wagner, 1843), and according to Dobson, contains two other species—*Vampyrus bidens* Spix and *Lophostoma brasiliense* Peters. *V. bidens*, however, is the type of *Tonatia* Gray. The genus was published in volume V of Griffith's Cuvier, Animal Kingdom, as follows: "*Vampyrus*, it is understood, was long ago appropriated by M. Geoffroy (in a MS. communication to Dr. Leach) as a generic name to *V. spectrum* of Linnæus; but Spix in his splendid work on the animals of Brazil, now publishing, has adopted it for three species there described, the *Cirrhosus*, *Soricinus*, and *Bidens.* * * * Mr. Gray proposes * * * to divide the three species of Spix's genus *Vampyrus* above mentioned into two genera, the one under the name *Istiophorus*, including *Cirrhosus* and *Soricinus*, and the other under that of *Tonatia*, including *Bidens* only."[†]

PTEROPODIDÆ.

Among the fruit-eating bats, changes are inevitable in the well-known genera *Macroglossus* (or *Carponycteris*), *Cynonycteris* (or *Xantharpyia*), *Harpyia*, and *Cephalotes.* *Macroglossus*, preoccupied in Entomology, was replaced in 1891 by *Carponycteris*, Lydekker. This latter name is antedated by *Kiodotus*, proposed in 1840 by Blyth,[‡] who had previously discovered that *Macroglossus* was not available, and suggested a Latinized form of the common name as a substitute. The adoption of *Kiodotus* necessitates a new name for the subfamily Macroglossinæ or Carponycterinæ, which may be called **Kiodotinæ.** This subfamily includes the genera *Callinycteris*, *Eonycteris*, *Kiodotus*, *Melonycteris*, *Nesonycteris*, *Notopteris*, and *Trygenycteris*.

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[*] First published on plates of D'Orbigny's 'Voyage dans l'Amerique meridionale,' which were distributed separately in 1836. In 1838 Gray quoted the genus with a brief diagnosis, merely mentioning the species by name. The specific name, however, dates from 1847, the year when the text accompanying the plates appeared.

[†] P. 71, foot-note, 1827.

[‡] Cuvier's Animal Kingdom, 69 footnote, 1840; new ed., 69 footnote, 1849. The first edition not seen; Mr. F. H. Waterhouse, Librarian of the Zoölogical Society of London, has kindly verified the reference for me,

The genus known as *Cynonycteris* by Peters and Dobson, and as *Xantharpyia* by Lydekker, must give way to *Rousettus* Gray, 1821,* which has more than 20 years' priority. *Rousettus* was based on *Pteropus aegyptiacus; Xantharpyia* Gray, 1843, included *P. amplexicaudatus*, *P. aegyptiacus*, and *P. stramineus;* and *Cynonycteris* Peters, 1852, had for its type *P. collaris*. As all these species are now considered congeneric, it is simply a matter of selecting the earliest name.

Harpyia is preoccupied in Entomology, and in the case of *Cephalotes* an unfortunate transfer of the name must be made similar to that of *Vespertilio*, to which Miller has already called attention. *Cephalotes* and *Harpyia* are closely related, and may therefore be considered together. *Cephalotes* was proposed by Geoffroy in 1810† for two species, *Cephalotes peronii* Geoffroy, from the island of Timor, and *Cephalotes pallasii* Geoffroy, a new name for *Vespertilio cephalotes* Pallas. Illiger in the following year, 1811, based his *Harpyia* on *Vespertilio cephalotes*. But, as already stated, *Harpyia* is preoccupied in Entomology, since Ochsenheimer selected it in 1810 for a group of European moths and gave a detailed description of the genus and several species in his work entitled 'Die Schmetterlinge von Europa' (vol. III, p. 19). *Harpyia* is therefore not available either for the bat or the eagle, to which it has so long been applied. Even were this not the case, it could hardly claim recognition, as it is in reality merely a synonym of *Cephalotes*.

It may be claimed that Geoffroy did not name the type of his genus *Cephalotes*, and under the rule that the first reviser of a genus has the right to fix the type when none has been designated by the original describer, Illiger could select *Vespertilio cephalotes* as the type of *Harpyia* (thus leaving *Cephalotes peronii* as the type of the genus *Cephalotes*), and his verdict would be final. Certain it is that he has been followed by Temminck, Gray, Dobson and others, until *C. peronii* has become almost universally associated with *Cephalotes* and *V. cephalotes* with *Harpyia*. It may well be questioned whether the type of *Cephalotes* was really left in uncertainty, and whether Illiger deliberately

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* London Medical Repository, XV, p. 299, Apr. 1, 1821.

† Ann. Mus. d'Hist. Nat. Paris, XV, pp. 101–108.

'fixed' it, or, not having seen Geoffroy's paper,* simply based *Harpyia* on *Vespertilio cephalotes*, which he recognized as distinct from other species of *Vespertilio*. The original description seems to leave little doubt that Geoffroy intended *cephalotes* and not *peronii* as the type of his genus, for he says: "Nous donnons ce nom à la céphalote de Pallas et à une nouvelle espèce du voyage aux terres australes, qui ont une trés-grande affinité avec les rousettes, mais qui en diffèrent assez pour ne pouvoir être comprises dans le même genre" (p. 101). Again: "Pallas m'a fourni le nom de céphalote" (p. 104). If this is not conclusive, it is only necessary to refer to Isidore Geoffroy's explanation of the case,† in which he calls attention to Illiger's transposition of the type, stating that *Vespertilio cephalotes* was actually the type of *Cephalotes*, and that Geoffroy afterwards perceiving that *cephalotes* and *peronii* were generically distinct proposed *Hypoderma* for the latter species. He says: "Ce genre [*Cephalotes*], établi par Geoffroy Saint-Hilaire, a pour type une espèce très-remarquable par son système dentaire, le *Vespertilio Cephalotes* de Pallas. * * * Depuis cette époque, de nouvelles observations ont démontré la nécessité de séparer ces deux Chauve-Souris, semblables à quelques égards, mais différant l'une de l'autre par de nombreux et importans caractères. Cette séparation a été effectuée par Geoffroy dans un travail publié tout récemment (Leçons sténog.), où le groupe peu naturel des Céphalotes est partagé en deux genres, l'un conservant le nom de *Cephalotes*, c'est celui qui a pour type le *Vespertilio Cephalotes;* l'autre nommé *Hypoderma*, c'est celui qui a pour type la Céphalote de Péron. * * * Quelques auteurs, ayant déjà senti la nécessité de séparer les deux Céphalotes, ont proposé de donner le nom d'*Harpya* créé par Illiger, a la véritable Céphalote, le *Vespertilio Cephalotes* de Pallas, et de transporter le nom *Cephalotes* à l'espèce de Péron." *Hypoderma*, like *Harpyia*, is preoccupied in Entomology,‡ and since no other generic name seems to have been proposed for *Cephalotes peronii*, a new name is required for the group. The genus may therefore be called **Dobsonia** in honor of the late Dr. George E. Dobson who devoted much attention to the study of the Chiroptera.

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* Illiger does not refer to the paper or to Geoffroy's species *Cephalotes peronii.*

† Dict. Classique d'Hist. Nat., XIV, p. 706, 1828.

‡ According to Agassiz the name was proposed by Clark, in 1815, in his 'Essays on the Bots of Horses and other Animals.' I have been unable to find the name in this paper, but it was subsequently used by Latreille in 1825, in his 'Fam. Nat. du Règne Animal,' V, p. 503.

Thomas has recently adopted *Uronycteris* to replace *Harpyia*,* but this name was based on *Cynopterus albiventer* Gray, which, according to Dobson, is synonymous with *Vespertilio cephalotes*. *Uronycteris* is therefore a synonym of *Cephalotes* Geoffroy. Transferring *Cephalotes* to the species to which it really belongs, the forms usually referred to it will stand *Dobsonia peronii* (Geoff.) and *Dobsonia minor* (Dobson), while those usually placed in *Harpyia* will stand, *Cephalotes cephalotes* (Pallas) and *Cephalotes major* (Dobson).

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*Novitates Zoologicæ, II, p. 163, 1895.

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PROCEEDINGS

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DESCRIPTIONS OF TWENTY NEW SPECIES AND A NEW SUBGENUS OF *PEROMYSCUS* FROM MEXICO AND GUATEMALA.

BY C. HART MERRIAM.

The enormous collection of mice of the genus *Peromyscus* made in Mexico and Guatemala by Mr. E. W. Nelson and his assistant, Mr. E. A. Goldman, contains many novelties, some of which are here described. Two of the new species, the largest yet discovered, are separated subgenerically under the name *Megadontomys*. Seven of the others belong to a well marked group distinguished by rather large size, long, soft and very dense fur, dark color, and a general agreement in cranial and dental characters.* It is but a step from *P. guatemalensis* of this series to *totontepecus* of the *mexicanus* series, and another step covers the related *tehuantepecus* and *oaxacensis*. Three others (*felipensis*, *gratus*, and *levipes*) belong to the *truei-difficilis* group, of which *P. hylocetes* may be an aberrant member, and one (*musculoides*) is distantly connected with the *leucopus* series. Standing widely apart from all of these is *P. mekisturus*, an extraordinary long-tailed animal, perhaps arboreal, from the mountain slope at Chalchicomula, Puebla.

Subgenus MEGADONTOMYS nobis.

Type, *Peromyscus* (*Megadontomys*) *thomasi* sp. nov., from Mts. near Chilpancingo, Guerrero, Mexico.

Characters.—Size large (the two known species as large as roof rats); ears and tail long and very scantily haired; pelage long, soft, and very dense.

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* The new species in the series in question are: *zahrynchus*, *guatemalensis*, *lepturus*, and the slightly divergent *megalops*, *auritus*, and *comptus*.

Skull similar in general to that of *Peromyscus*, but very large and massive; rostrum and nasals much produced, the latter expanded anteriorly and projecting far beyond incisors. Molars very large and heavy (the upper series in type species measuring 6.4 mm.), with short tubercles which wear off while the animal is still young, leaving flat crowns; 1st and 2d lower molars with a supplementary narrow enamel loop on each side; 3d lower molar with 3 salient and 2 renëtrant angles on each side. Plantar tubercles 7. Mammæ 6: pectoral $\frac{1}{1}$, inguinal $\frac{2}{2}$.

Peromyscus (**Megadontomys**) **thomasi** sp. nov.

Type from Mts. near Chilpancingo, Guerrero, Mexico (alt. 9700 ft.). No. 70142, ♂ old, U. S. Nat. Mus., Biological Survey Coll. Collected Dec. 24, 1894, by E. W. Nelson and E. A. Goldman. Orig. No 7250.

Characters.—Size very large; ears large and nearly naked; tail very long (longer than head and body) and nearly naked; whiskers large and long, reaching shoulders; hind foot very long (34 mm.); pelage long and rather coarse. Similar to *nelsoni*, but more fulvous.

Color.—End of nose black; upper parts from nose to tail fulvous, brightest and purest on cheeks and sides, darkest and abundantly mixed with black hairs on back; a blackish ring round eye; under parts white, the basal plumbeous fur showing through; pectoral region in some specimens suffused with salmon-fulvous; fore and hind feet white; ankles blackish.

Cranial and dental characters.—Skull very much elongated, particularly the rostrum and nasals; nasals produced and expanded anteriorly; supraorbital ridges strongly developed; anteorbital vacuities drawn out on side of rostrum and only slightly notching root of zygoma; interparietal very large and broad, subtriangular; incisive foramina very large; postpalatal notch broad. Molars large with flat crowns (except in young), measuring about 6.5 mm.; crown of last lower molar elongate with enamel much convoluted, presenting 3 salient and 2 reëntrant angles on each side. So far as known species are concerned, the skull of *thomasi* requires comparison with only a single species—*nelsoni*. It differs from *nelsoni* in greater massiveness, in the possession of prominent supraorbital ridges, and in the stronger development of the posterior reëntrant angle of the last lower molar.

Measurements.—Type specimen: Total length 350; tail vertebræ 188: hind foot 34. Average of 7 specimens from type locality: Total length 330; tail vertebræ 175; hind foot 32.8.

Peromyscus (**Megadontomys**) **nelsoni** sp. nov.

Type from Jico, Vera Cruz, Mexico (alt. 6000 ft.). No. 55024, ♀ ad., U. S. Nat. Mus., Biological Survey Coll. Collected July 10, 1893, by E. W. Nelson. Orig. No. 5202.

Characters.—Size large; ears large and nearly naked; tail very long and scantily haired. Similar to *thomasi*, but darker and less fulvous; skull lacking the supraorbital beads.

Color.—Upper parts grayish brown, becoming dusky on nose, around eyes, and along middle of back; under parts white, the plumbeous basal fur showing through; wrists, ankles, and tail dusky; fore feet white; hind feet whitish strongly clouded with dusky.

Cranial characters.—Skull like that of *thomasi*, but less massive, lacking the supraorbital ridges, and with the posterior reëntrant angle on inner side of m_3 less pronounced. In *thomasi* the supraorbital ridges slightly overhang the orbits so that they intercept the dividers in taking the interorbital breadth; in *nelsoni* the upper surface of the frontal interorbitally is so much narrower that in taking this measurement the dividers rest on the vertical plane of the orbit about 2 mm. below the top of the frontal.

Measurements.—Type specimen: Total length 302; tail vertebræ 172; hind foot 35. Average of 2 specimens from type locality: Total length 310; tail vertebræ 171; hind foot 33.5.

Peromyscus zarhynchus sp. nov.

Type from Tumbala, Chiapas, Mexico. No. 76119, ♀ ad., U. S. Nat. Mus., Biological Survey Coll. Collected Oct. 20, 1895, by E. W. Nelson and E. A. Goldman. Orig. No. 8606.

Characters.—Size very large; ears large and nearly naked; tail very long and appearing naked; hind feet long and slender; coloration dark.

Color.—Upper parts dusky, becoming seal brown on sides (sometimes chestnut fulvous on flanks); under parts whitish, the plumbeous basal fur showing through; pectoral region strongly washed with chestnut, the chestnut suffusion sometimes spreading over belly; tail (skin) dusky above, yellowish white below; fore and hind feet whitish, the latter slightly clouded.

Cranial characters.—Skull very large and long with exceedingly elongated rostrum; small audital bullæ; weak and slender zygomata; zygomata narrow anteriorly, and only slightly notched by anteorbital slit, which is drawn out on side of rostrum as in *Megadontomys.* The skull resembles that of *Megadontomys nelsoni* in size and general appearance, but is distinguishable by the much greater length of rostrum and incisive foramina, narrower interparietal, less flaring nasals, and much smaller molar teeth. It does not require close comparison with any known species.

Measurements.—Type specimen: Total length 324; tail vertebræ 176; hind foot 35. Average of 13 specimens from type locality: Total length 314; tail vertebræ 169; hind foot 35.4.

Peromyscus zarhynchus cristobalensis subsp. nov.

Type from San Cristobal, Chiapas, Mexico. No. 76109, ♀ ad., U. S. Nat. Mus., Biological Survey Coll. Collected Oct. 2, 1895, by E. W. Nelson and E. A. Goldman. Orig. No. 8536.

Characters.—Similar to *P. zarhynchus* from Tumbala, but paler and more fulvous, with slightly smaller skull.

Color.—Upper parts dusky brown, becoming dusky on nose, around eyes, and along middle of back and everywhere mixed with fulvous tipped hairs, the fulvous predominating on cheeks and sides; under parts, feet, and tail as in *P. zarhynchus.*

Cranial characters.—Skull similar to that of *P. zarhynchus*, but slightly shorter (averaging 30–31 instead of 32–33), with braincase broader and zygomata stronger and more spreading anteriorly.

Measurements.—Type specimen: Total length 322; tail vertebræ 170; hind foot 34. Average of 10 specimens from type locality: Total length 312; tail vertebræ 166; hind foot 33.8.

Peromyscus guatemalensis sp. nov.

Type from Todos Santos, Guatemala (alt. 10,000 ft.). No. 76861, ♂ ad., U. S. Nat. Mus., Biological Survey Coll. Collected Dec. 31, 1895, by E. W. Nelson and E. A. Goldman. Orig. No. 8991.

Characters.—Size medium (larger than *mexicanus*, but decidedly smaller than *zarhyncus*); tail long and scantily haired; ears medium; fur long, soft, and lax; color very dark.

Color.—Upper parts dusky, finely mixed with grayish; an ill defined blackish band from side of nose to ear; cheeks and flanks dull brownish fulvous; under parts white, the plumbeous basal fur showing through; a salmon fulvous pectoral patch; wrists and ankles blackish; fore feet white; hind feet dusky at base, then white; tail dusky, irregularly paler below (sometimes white or yellowish). Some specimens have the middle part of the back nearly black and much blackish on nose. Specimens from Pinabete, Chiapas, agree closely with those from the type locality. Specimens from Calel, Zuñil, and Volcan Santa Maria, Guatemala, are somewhat paler.

Cranial characters.—Skull and rostrum large and elongate, intermediate in size between *mexicanus* and *cristobalensis;* audital bullæ as in the latter (decidedly larger than in *mexicanus*).

Measurements.—Type specimen: Total length 273; tail vertebræ 141; hind foot 31. Average of 10 specimens from type locality: Total length 268; tail vertebræ 138; hind foot 30.5.

Peromyscus lepturus sp. nov.

Type from Mt. Zempoaltepec, Oaxaca, Mexico (alt. 8200 ft.). No. 68612, ♂ ad., U. S. Nat. Mus., Biological Survey Coll. Collected July 8, 1894, by E. W. Nelson and E. A. Goldman. Orig. No. 6381.

Characters.—A miniature of *P. guatemalensis*: size small (smaller than *mexicanus*); ears medium and nearly naked; tail about as long as head and body, slender and rather scantily haired; molars large; fur long and rather soft; color dark.

Color.—Upperparts brownish with a broad dusky dorsal area, becoming brownish-fulvous on cheeks and sides; nose and ring round eye dusky; underparts, fore feet, and small spot on end of nose whitish; wrists and ankles dusky; hind feet clouded with dusky, toes white; tail dusky above, paler below. Other specimens are so much darker as to appear dusky all over when seen from above, although the sides are always more or less brownish.

Cranial and dental characters.—Skull small and short (compared with others of the series); braincase rather broadly rounded and flattened; zygomata weak and not strongly notched by anteorbital slit; audital bullæ small but slightly larger than in the decidedly larger *P. mexicanus;* molars slightly larger than in *mexicanus* and series of same length, though narrower than, in the allied but very much larger *P. guatemalensis.*

Measurements.—Type specimen: Total length 238; tail vertebræ 114; hind foot 28. Average of 5 specimens from type locality: Total length 230; tail vertebræ 112; hind foot 27.3.

Remarks.—*P. lepturus* might easily be mistaken for the young of the dark form of *mexicanus* (*totontepecus*) which also occurs on Mt. Zempoaltepec, but a glance at the skulls is sufficient to distinguish them, that of *P. lepturus* being hardly three-fourths as large as *totontepecus* while its molar teeth are even larger than those of *totontepecus.*

Peromyscus megalops sp. nov.

Type from Mts. near Ozolotepec, Oaxaca, Mexico. No. 71592, ♂ old, U. S. Nat. Mus., Biological Survey Coll. Collected March 26, 1895, by E. W. Nelson and E. A. Goldman. Orig. No. 7733.

Characters.—Size rather large; ears rather short; tail long and scantily haired; fur long and soft; coloration dark with a rich chestnut fulvous suffusion.

Color.—Upperparts finely mixed black and dark fulvous, the black predominating between ears and along back; the salmon-fulvous predominating on sides and cheeks; underparts whitish, the plumbeous basal fur showing through; pectoral region salmon-fulvous; wrists and ankles dusky; fore feet whitish; hind feet clouded.

Cranial characters.—Skull large and long, resembling that of *guatemalensis* in size and general characters but audital bullæ decidedly smaller; incisive foramina much more widely open; frontals conspicuously broader and developing a distinct supraorbital bead.

Measurements.—Type specimen: Total length 282; tail vertebræ 150; hind foot 31. Average of 5 specimens from type locality: Total length 278; tail vertebræ 147; hind foot 31.

Peromyscus auritus sp. nov.

Type from Mts. 15 miles west of Oaxaca, State of Oaxaca, Mexico. No. 68438, ♀ old, U. S. Nat. Mus., Biological Survey Coll. Collected Sept. 17, 1894, by E. W. Nelson and E. A. Goldman. Orig. No. 6795.

Characters.—Similar to *P. megalops,* but ears and audital bullæ *very much larger* and coloration duller. Similar to *P. guatemalensis,* but paler and less fulvous, and frontal much narrower between orbits.

Color.—Upper parts grayish brown, becoming dusky on sides of nose, around eyes, and on back, with a pale dull fulvous wash on cheeks and sides; under parts whitish, the plumbeous basal fur showing through; wrists and ankles dusky; fore and hind feet whitish; tail dusky above, whitish beneath.

Cranial characters.—Skull similar to that of *auritus*, but audital bullæ larger; nasals longer and more pointed posteriorly (exceeding premaxillæ), and incisive foramina less broadly open. Similar to *guatemalensis*, but frontal very much broader between orbits and with a distinct supraorbital bead.

Measurements.—Type specimen: Total length 288; tail vertebræ 148; hind foot 30.5. Average of 4 specimens from type locality: Total length 281; tail vertebræ 148; hind foot 31.5.

Peromyscus comptus sp. nov.

Type from Mts. near Chilpancingo, Guerrero, Mexico. No. 70191, ♂ ad., U. S. Nat. Mus., Biological Survey Coll. Collected Dec. 24, 1894, by E. W. Nelson and E. A. Goldman. Orig. No. 7266.

Characters.—Size rather large; ears large; tail rather long and scantily haired; fur long and relatively harsh; color in winter pelage bright golden-fulvous. Similar to *P. auritus*, but pelage coarser and color much more fulvous, with much less blackish on nose and side of face, and much whiter belly.

Color.—(Adults in Dec.): Upper parts from nose to tail rich golden-fulvous, the back and rump liberally lined with black hairs; black on nose reduced to a very small spot on top and a spot at base of whiskers; blackish ring round eye very small; under parts milk-white, sometimes tinged with yellowish; wrists and ankles dusky; fore feet white; hind feet whitish, more or less clouded; tail dusky above, whitish below.

Cranial characters.—Skull like that of *auritus*, but rostrum and nasals shorter, the latter less pointed behind; molars slightly smaller.

Measurements.—Type specimen: Total length 285; tail vertebræ 150; hind foot 31. Average of 10 specimens from type locality: Total length 273; tail vertebræ 143; hind foot 30.4.

Peromyscus mexicanus totontepecus subsp. nov.

Type from Totontepec, Oaxaca, Mexico (alt. 6500 ft.). No. 68624, ♀ ad., U. S. Nat. Mus., Biological Survey Coll. Collected July 16, 1894, by E. W. Nelson and E. A. Goldman. Orig. No. 6465.

Characters.—Similar to *P. mexicanus*, but larger and darker, with slightly shorter ears and denser fur.

Color.—Upper parts dusky brown becoming dull fulvous-brown on cheeks and sides; under parts whitish, the plumbeous basal fur everywhere showing through; a salmon pectoral patch sometimes present; fore feet whitish; ankles and basal part of hind feet dusky, rest of hind feet whitish; tail dusky above, irregularly whitish or yellowish below. According to season, the prevailing color varies from dull fulvous-brown to dusky with a blackish dorsal area.

Cranial characters.—Skull like that of *mexicanus*, but interparietal and audital bullæ averaging larger, and anterior root of zygoma even less notched by anteorbital slit.

Measurements.—Type specimen: Total length 261; tail vertebræ 136;

hind foot 28. Average of 10 specimens from type locality: Total length 254; tail vertebræ 130; hind foot 28.6.

Remarks.—This animal is only a mountain form of *mexicanus*, which it closely resembles. It differs far more from the geographically nearer *mexicanus orizabæ* than from true *mexicanus*.

Peromyscus mexicanus saxatilis subsp. nov.

Type from Jacaltenango, Huehuetenango, Guatemala. No. 77296, ♂ ad., U. S. Nat. Mus., Biological Survey Coll. Collected Dec. 19, 1895, by E. W. Nelson and E. A. Goldman. Orig. No. 8824.

Characters.—Similar to *P. mexicanus*, but paler, upper parts more distinctly lined with black hairs, under parts whiter.

Color.—Upper parts grayish fulvous (in some specimens fulvous), everywhere conspicuously lined with black hairs, which on middle of back form a distinctly darker area; cheeks and sides fulvous, usually pale; face between eyes grayish, slightly tinged with pale fulvous and grizzled by dark hairs; end of nose (except whitish tip), patch at base of whiskers, and narrow ring round eye blackish; under parts, including lips, wrists, and fore feet, white; ankles dusky; hind feet white; tail dusky above, irregularly whitish or yellowish below.

Cranial characters.—Skull like that of *mexicanus*, but with even less distinct supraorbital beads, smaller incisive foramina, and smaller molars.

Measurements.—Type specimen: Total length 238; tail vertebræ 122; hind foot 27.5. Average of 10 specimens from type locality: Total length 245.5; tail vertebræ 127.5; hind foot 27.5.

Peromyscus mexicanus orizabæ subsp. nov.

Type from Orizaba, Vera Cruz, Mexico (alt. 4200 ft.). No. 58197, ♂ ad., U. S. Nat. Mus., Biological Survey Coll. Collected Jan. 29, 1894, by E. W. Nelson and E. A. Goldman. Orig. No. 5787.

Characters.—Size medium; ears large and nearly naked; tail long and nearly naked; coloration dark. Skull with broadly spreading zygomata. Similar to *P. mexicanus*, but differing in slightly larger size, decidedly longer tail and hind feet, slightly more white on hind feet, and decidedly more spreading zygomata.

Color.—Upper parts: top of head and back dusky seal-brown from intimate mixture of black and chestnut, the black predominating and shading into dull chestnut-fulvous on sides and cheeks; top and sides of nose and ring round eye dusky; underparts, including lips, wrists, and fore feet, white; ankles dusky; hind feet whitish, clouded basally with dusky; a pale salmon suffusion on pectoral region, sometimes extending over breast; tail dusky above, irregularly whitish or yellowish below.

Cranial characters.—Skull like that of *mexicanus*, but zygomata decidedly stronger, more squarely and widely spreading anteriorly, and more deeply notched by anteorbital slits; the vertical lamina on outer side of slit much more prominent.

Measurements.—Type specimen: Total length 257; tail vertebræ 139;

hind foot 29.5. Average of 10 specimens from type locality: Total length 258; tail vertebræ 138; hind foot 29.

Peromyscus tehuantepecus sp. nov.

Type from Tehuantepec, Oaxaca, Mexico. No. 75302, ♂ ad., U. S. Nat. Mus., Biological Survey Coll. Collected May 23, 1895, by E. W. Nelson and E. A. Goldman. Orig. No. 7980.

Characters.—Size medium; ears medium and nearly naked; tail medium, scantily haired; color brownish or buffy-fulvous. Similar to P. *mexicanus*, but very much paler and with distinctive cranial characters.

Color.—Upper parts pale brownish-fulvous, slightly darkened on back by admixture of black hairs, becoming pure buffy-fulvous on cheeks and sides; under parts and lips whitish, often tinged with yellowish or buffy and with a buffy-salmon suffusion on pectoral region; ankles dusky in front, the dusky reaching out a short distance on metatarsus; fore and hind feet whitish; tail dusky, its under side irregularly marked with yellowish.

Cranial characters.—Skull similar to that of *mexicanus*, but braincase and zygomata narrower; rostrum larger; *interparietal decidedly larger.*

Measurements.—Type specimen: Total length 243; tail vertebræ 124; hind foot 26. Average of 4 specimens from type locality: Total length 248.5; tail vertebræ 127; hind foot 27.

Peromyscus oaxacensis sp. nov.

Type from Cerro San Felipe, Oaxaca, Mexico (alt. 10,000 ft.). No. 68426, ♂ yg. ad. U. S. Nat. Mus., Biological Survey Coll. Collected Sept. 1, 1894, by E. W. Nelson and E. A. Goldman. Orig. No. 6700.

Characters.—Size medium, about equalling *P. mexicanus;* ears medium and nearly naked; tail long and scant haired but decidedly more hairy than in *mexicanus* and its subspecies, from which it differs further in being sharply bicolor.

Color.—Upperparts from nose to tail dull fulvous, darkened on back by admixture of black hairs; a very narrow dusky ring round eye; underparts, lips, and fore feet white; ankles dusky; hind feet white except at extreme base, where dusky of ankles reaches down a short distance; tail dusky above, white below. Specimens from Mts. 15 miles west of Oaxaca show two pelages, one considerably darker than that here described.

Cranial and dental characters.—Skull similar to that of *mexicanus*, but postpalatal notch much broader; audital bullæ larger; m^1 narrower and less bellied on inner side behind anterior cusp; m_1 with a supplementary narrow enamel loop on outer side in front of posterior cusp.

Measurements.—Type specimen: Total length 242; tail vertebræ 122; hind foot 27.

Peromyscus felipensis sp. nov.

Type from Cerro San Felipe, Oaxaca, Mexico (alt. 10,200 ft.). No. 68409, ♂ ad. U. S. Nat. Mus., Biological Survey Coll. Collected Aug. 22, 1894, by E. W. Nelson and E. A. Goldman. Orig. No. 6611.

Characters.—Similar to *P. difficilis* Allen, but slightly larger and very much darker, with slightly smaller ears and much coarser pelage. Ears large and appearing naked; tail long and well haired; bicolor.

Color.—Upper parts dusky grayish; under parts, lips, and sides of nose white, the plumbeous basal fur showing through; pectoral region usually salmon; ring round eye dusky; ankles dusky; fore and hind feet white; tail bicolor, dusky above, whitish below.

Cranial characters.—Skull rather large; braincase well rounded; audital bullæ large and inflated. Compared with *P. difficilis* the skull is slightly larger and the rostrum slightly heavier.

Measurements.—Type specimen: Total length 238; tail vertebræ 125; hind foot 27.5. Average of 10 specimens from type locality: Total length 241.5; tail vertebræ 127; hind foot 26.8.

Peromyscus gratus sp. nov.

Type from Tlalpam, Valley of Mexico. No. 50619, ♀, U. S. Nat. Mus., Biological Survey Coll. Collected Nov. 30, 1892, by E. W. Nelson. Orig. No. 3927.

Characters.—Size small; ears large; tail a little longer than head and body and well haired; color pale fulvous. Similar to *P. truei*, but more highly colored; ears shorter and tail longer.

Color.—Upper parts pale buffy-fulvous, everywhere darkened by admixture of black hairs; under parts milk-white; ankles dusky all round except along outer side of calcaneum, which is white; fore and hind feet white; tail dusky, indistinctly paler on under side.

Cranial characters.—Skull small; braincase very globular and smoothly rounded; frontals rather broad interorbitally, but without trace of supraorbital bead; rostrum small; zygomata rather weak but strongly notched by anteorbital slit; audital bullæ very large and inflated. The skull resembles that of *truei*, but is smaller, with decidedly smaller rostrum and shorter palate.

Measurements.—Type specimen: Total length 209; tail vertebræ 114; hind foot 23. Average of 10 specimens from type locality: Total length 204; tail vertebræ 110.5; hind foot 22.8.

Peromyscus levipes sp. nov.

Type from Mt. Malinche, Tlaxcala, Mexico (alt. 8400 ft.). No. 53673, ♂ ad., U. S. Nat. Mus., Biological Survey Coll. Collected May 12, 1893, by E. W. Nelson. Orig. No. 4799.

Characters.—Size medium or rather small; ears rather large; tail slightly longer than head and body, well haired and bicolor. Similar to *P. gratus*, but color duller, tail sharply bicolor instead of only faintly paler below, and skull different.

Color.—Upper parts grayish-brown becoming pale buffy-fulvous on cheeks and lower sides; under parts and lips white with a salmon suffusion on pectoral region; ankles dusky; fore and hind feet white; tail dusky above, whitish below.

Cranial characters.—Skull resembling that of *P. gratus*, but larger, braincase flatter; zygomata more spreading and less notched by anteorbital slit; rostrum heavier as seen from below; audital bullæ smaller; nasals longer.

Measurements.—Type specimen: Total length 200; tail vertebræ 102; hind foot 23.5.

Peromyscus hylocetes sp. nov.

Type from Patzcuaro, Michoacan, Mexico (alt. about 8000 ft.). No. 50423, ♀ ad., U. S. Nat. Mus., Biological Survey Coll. Collected July 27, 1892, by E. W. Nelson and E. A. Goldman. Orig. No. 2961.

Characters.—Size medium; ears medium; tail shorter than head and body well haired and sharply bicolor. Color grayish.

Color.—Upperparts buffy gray becoming buffy ochraceous on sides and with a broad dark dorsal area resulting from bountiful admixture of black hairs; underparts, lips, and fore feet whitish; wrists and ankles dusky, the color of latter spreading over basal part of hind foot; tail dusky above, white below.

Cranial characters.—Skull rather broad and short, with moderately spreading zygomata and no supraorbital beads; braincase rather full and broadly rounded; audital bullæ smaller than in the *truei-difficilis* group, but larger than in *mexicanus* and slightly larger than *oaxacensis.*

Measurements.—Type specimen: Total length 238; tail vertebræ 114; hind foot 25. Average of 3 specimens from type locality: Total length 232; tail vertebræ 112; hind foot 26

Peromyscus musculoides sp. nov.

Type from Cuicatlan, Oaxaca, Mexico (alt. 1800 ft.). No. 69661, ♂ old, U. S. Nat. Mus., Biological Survey Coll. Collected Oct. 14, 1894, by E. W. Nelson and E. A. Goldman. Orig. No. 6892.

Characters.—Size a little larger than *Mus musculus*, which it greatly resembles; pelage short, close and rather coarse; ears rather short; tail shorter than head and body, moderately haired, bicolor.

Color.—Upperparts drab gray, becoming brownish on sides; underparts, lips and sides of nose milk-white; ankles dusky; fore and hind feet white; tail brownish above, whitish below.

Cranial characters.—Skull small; braincase rounded; frontals broad between orbits but without trace of 'bead'; zygomata strongly notched by anteorbital slits; audital bullæ small.

Measurements.—Type specimen: Total length 187; tail vertebræ 88; hind foot 22.5. Average of 10 specimens from type locality: Total length 185; tail vertebræ 84.5; hind foot 22.5.

Peromyscus mekisturus sp. nov.

Type from Chalchicomula, Puebla, Mexico (alt. 8400 ft.). No. 64108, ♀ ad., U. S. Nat. Mus., Biological Survey Coll. Collected March 16, 1894, by E. W. Nelson and E. A. Goldman. Orig. No. 5951.

Characters.—Size small; ears large; tail enormously elongated and moderately haired; fur long and soft; color grayish-fulvous.

Color.—Upper parts gray anteriorly, becoming more and more suffused with olivaceous-fulvous to the rump, which is pale fulvous; back slightly darkened by black hairs, but no dark dorsal area; nose gray, with a small whitish fleck on extreme tip; ring round eye dusky; under parts buffy-whitish, becoming buffy on pectoral region and whitish on chin, lips, and sides of nose; wrists dusky; fore feet white; front of ankles and upper two-thirds of metatarsus dusky; rest of hind feet, toes, and sides of ankles white; tail dusky, indistinctly paler below.

Cranial characters.—Skull small; rostrum short and narrow; zygomata squarely but narrowly spreading anteriorly, the outer sides strongly convergent anteriorly; frontals narrow interorbitally without trace of supraorbital bead; braincase broad and rather flat; interparietal narrow; audital bullæ small.

Measurements.—Type specimen: Total length 249; tail vertebræ 155; hind foot 24.

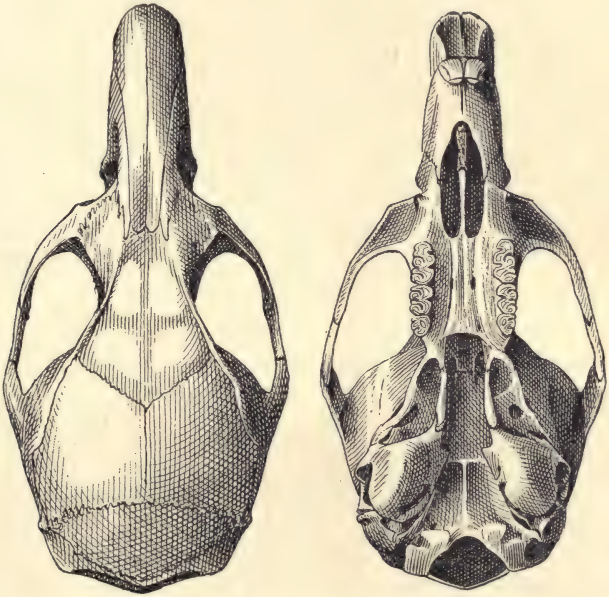

FIG. 20.—Skull of *Megadontomys thomasi* (× 1½).

See page 115.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

A NEW GENUS (*NEOTOMODON*) AND THREE NEW SPECIES OF MURINE RODENTS FROM THE MOUNTAINS OF SOUTHERN MEXICO.

BY C. HART MERRIAM.

Still another genus—and one strikingly different from any heretofore described—is represented by 57 specimens in Mr. E. W. Nelson's rich collections from southern Mexico. The animals were found living among dense grass at high elevations on Mt. Orizaba, Puebla; the Cofre de Perote, Vera Cruz; the mountains at Nahuatzin, Michoacan; and on Mt. Popocatapetl, Mt. Toluca, and others about the valley of Mexico. Those from Mt. Orizaba and the Cofre de Perote are distinct species; all the others may be classed together as a third species.

Genus NEOTOMODON nobis.

Type, *Neotomodon alstoni* sp. nov., from Nahuatzin, Michoacan, Mexico.

Characters.—Size of a large *Microtus;* ears large and nearly naked; tail medium or rather short; fur soft and dense; plantar tubercles 6; mammæ 6; pectoral $\frac{1}{1}$; inguinal $\frac{2}{2}$; general appearance intermediate between *Microtus* and *Peromyscus* of the *guatemalensis* group. Skull and teeth unique; skull broad and rather high; braincase short and rounded [in *N. alstoni* angular and truncate posteriorly in old age]; zygomata large and broadly spreading, the anterior root deeply notched by anteorbital slit, the outer lamina of which is produced far forward; incisive foramina very long and open; diastema $\frac{1}{3}$ the basal length of skull. Molars rooted, large, and very massive, with flat crowns and heavy enamel as in *Neotoma;* enamel loops open throughout; $m^{\underline{1}}$ and m^2 essentially alike, each with 3 salient enamel loops and 2 deep reëntrant angles on outer side and 2 salient loops and 1 shallow reëntrant angle on inner side, as in *Neotoma desertorum*, from which the teeth differ in having the loops more nearly transverse and the two ends of each crown more alike; $m^{\underline{3}}$ a cylindrical peg; enamel pattern of lower molars in general like that of *Hodomys*, with differences in detail: $m_{\overline{1}}$ and $m_{\overline{2}}$ with 3 salient loops and 2 reëntrant angles on each side, the middle loops of the two sides not opposite; $m_{\overline{2}}$ with anterior loop on outer side narrow and followed by a shallow reëntrant angle; $m_{\overline{3}}$ shaped much like letter S: outer side with 2 prominent and strongly convex loops and 1 deep reëntrant angle; inner side with a convex anterior loop, a moderately deep reëntrant angle, and a long flat heel which curves outward posteriorly to form posterior loop on outer side.

The enamel pattern of the crowns of the middle upper and 1st and 2d lower molars changes rapidly with wear; that of the last lower molar more slowly; in $m^{\underline{2}}$ the anterior reëntrant angle on outer side disappears, leaving a large anterior and small posterior lobe, with a small enamel island in the former; in $m_{\overline{1}}$ and $m_{\overline{2}}$ the anterior reëntrant angle on outer side and posterior reëntrant angle on inner side disappear, converting the crown into two large lobes not unlike a figure 8 turned sideways; in $m_{\overline{2}}$ the resulting shape is more like the letter S; in $m_{\overline{3}}$ the reëntrant angle on inner side disappears with age, leaving the inner side plain. The upper molars seem too large for the jaw, and the middle ones are sometimes tilted out of line.

Neotomodon alstoni sp. nov.

Type from Nahuatzin, Michoacan, Mexico (alt. 8500 ft.). No. 50534, ♂ old, U. S. Nat. Mus., Biological Survey Coll. Collected Oct. 12, 1892, by E. W. Nelson. Orig. No. 3580.

Characters.—Size of a rather large *Microtus pennsylvanicus;* ears large and scantily haired; hind feet rather long and slender; tail shorter than head and body, sharply bicolor, and moderately haired; color dusky grayish. *N. alstoni* is the largest of the three species here described.

Color.—Upper parts dusky grayish, darkened on back, and varying with season to dull fulvous brown; under parts dark plumbeous, washed with white and with a rather faint buffy suffusion on pectoral region; wrists and ankles dusky, the dusky extending out a short distance on metatarsus; fore and hind feet white; tail bicolor, dusky above, whitish below.

Cranial characters.—The cranial and dental characters have been fully described under the genus and need not be repeated. Compared with the other known species of the genus, *perotensis* and *orizabæ*, the skull is larger and heavier, and when old much more angular.

Measurements.—Type specimen (♂ old): Total length 225; tail vertebræ 103; hind foot 28. Average of 7 specimens from type locality: Total length 220; tail vertebræ 101; hind foot 26.5.

Remarks.—Specimens referred to this species were collected by Mr. Nelson at Nahuatzin, Michoacan, Huitzilac, Morelos, and the following places in the State of Mexico: Amecameca, Ajusco, north slope of Volcan Toluca, Toluca Valley, Salazar, and Mt. Popocatapetl.

Neotomodon perotensis sp. nov.

Type from Cofre de Perote, Vera Cruz, Mexico (alt. 9500 ft.). No. 54398, ♀ ad., U. S. Nat. Mus., Biological Survey Coll. Collected May 29, 1893, by E. W. Nelson. Orig. No. 4897.

Characters.—Similar to *N. alstoni*, but ears and tail shorter; color paler, with a distinct blackish dorsal stripe in summer pelage.

Color.— Upper parts in fresh summer pelage (end of May) grayish buff, grayest on head, buffy on sides, with a distinct (but not sharply limited) blackish band on back; under parts white, suffused with buffy on pectoral region, and with the plumbeous basal fur slightly showing through; wrists and ankles dusky; fore and hind feet white; tail sharply bicolor, dusky above, white below. Specimens in left-over winter pelage are much darker and resemble *N. alstoni.*

Cranial characters.—Skull similar to that of *N. alstoni*, but slightly smaller, and in old age not becoming so angular.

Measurements.—Type specimen: Total length 212; tail vertebræ 91; hind foot 24. Average of 4 specimens from type locality: Total length 213; tail vertebræ 92.5; hind foot 25.

Neotomodon orizabæ sp. nov.

Type from Mt. Orizaba, Puebla, Mexico (alt. 9500 ft.). No. 53486, ♂ old, U. S. Nat. Mus., Biological Survey Coll. Collected April 26, 1893, by E. W. Nelson. Orig. No. 4747.

Characters.—Similar to *N. alstoni* and *perotensis*, but much smaller and grayer, with slightly smaller ears and decidedly shorter tail. Resembles a gray *Microtus.*

Color.—Upper parts uniform buffy-gray; under parts white, suffused with buffy on pectoral region, with plumbeous basal fur showing through; wrists and ankles dusky; fore and hind feet whitish; tail sharply bicolor, brownish above, white below.

Cranial characters.—Skull like that of *perotensis*, but smaller and weaker.

Measurements.—Type specimen: Total length 194; tail vertebræ 81; hind foot 24. Average of 4 specimens from type locality: Total length 194; tail vertebræ 82; hind foot 25.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

ON SOME BIRDS FROM SANTA MARTA, COLOMBIA

BY OUTRAM BANGS

Mr. W. W. Brown, Jr., who is collecting in the Santa Marta region of Colombia for the Bangs Collection, sent a short time ago nearly seven hundred beautifully made bird skins as the result of his first two months' work—from middle of Dec., 1897, to middle of Feb., 1898. These birds were all taken within fifteen miles of Santa Marta and at elevations ranging from 500 to nearly 6000 feet, the larger part, however, being from the lowlands. Mr. Brown has not yet visited any of the higher mountains. I have thought it best to publish briefly on the collections as they come in, describing the forms which appear to be new and giving mere lists of the better known species. These preliminary notices may be followed by a more elaborate paper when the whole region of the Santa Marta Mountains has been covered.

I am much indebted to the unfailing kindness of Mr. Robert Ridgway and Dr. Chas. W. Richmond in helping me identify the birds and allowing me to work in the National Museum and make comparisons with the material in that collection.

A series of the birds has been presented to the United States National Museum; the rest of the collection, including the types of the new forms, remain in the Bangs collection.

(NOTE.—All measurements are in millimeters.)

Crypturus columbianus Salvad.

1 specimen. At the time the British Museum Catalogue appeared this bird was known by the type specimen alone. The one example so far sent agrees exactly with the description of the species.

Crypturus pileatus Bodd.

1 specimen, ♀ ad. This one specimen is very different from the general run of *C. pileatus*, and probably represents a good race, at least. It is much deeper in color. The lower parts are a deep rich cinnamon without grayer pectoral band.

Crax alberti Fraser.

1 specimen, ♂ ad.

Penelope argyrotis (Bonap.)

1 specimen, ♂ ad.

Leptotila verreauxi Bonap.

2 specimens, ♂ ♂.

Columbigallina passerina pallescens (Baird).

1 specimen, ♂.

Columbigallina rufipennis (Bonap.)

3 specimens, ♂ ♂, ♀.

Buteo latissimus (Wils.)

3 specimens, ♂ and ♀ ad., ♀ yg., winter residents.

Rupornis magnirostris (Gmel.)

1 specimen, ♀ ad.

Micrastur semitorquatus (Vieill.)?

1 specimen, ♂.

Syrnium perspicillatum (Latham).

1 specimen, ♂.

Ara chloroptera Gray.

1 specimen, ♀.

Ara militaris (Linn.)

2 specimens, ♂, ♀.

Brotogeris jugularis (Müll.)

16 specimens, ♂ ♂, ♀ ♀.

Pionus menstruus (Linn.)

2 specimens, ♂, ♀.

Pionus sordidus (Linn.)

2 specimens, ♂, ♀. At an altitude of 5000 ft. Mr. Brown took, Feb. 12 and 13, 1898, a pair of this rare parrot, known before only from Venezuela. These birds agree exactly in measurements, color of bill and general coloration with the descriptions of *P. sordidus*. An actual comparison of specimens, however, might well show the Santa Marta examples to represent a different race.

Crotophaga sulcirostris Sw.

2 specimens, ♂ ♂.

Piaya cayana mehleri (Bonap.)

7 specimens, ♂ ♂, ♀ ♀.

Momotus subrufescens Scl.

23 specimens, ♂ ♂, ♀ ♀. Topotypes.

Ceryle torquata (Linn.)

2 specimens, ♀ ♀.

Ceryle amazona (Lath.)

1 specimen, ♀.

Ceryle americana (Gmel.)

2 specimens, ♀ ♀.

Bucco ruficollis (Wagl.)

8 specimens, ♂ ♂, ♀ ♀.

Malacoptila mystacalis (Lafr.)

2 specimens, ♂, ♀.

Galbula ruficauda pallens subsp. nov.

17 specimens, ♂ ♂, ♀ ♀.

Type from Santa Marta, Colombia, No. 5073, coll. of E. A. and O. Bangs. ♂ adult. Collected Dec. 27, 1897, by W. W. Brown, Jr.

Subspecific characters.—Size of true *G. ruficauda;* bill longer; sexes very different, the female being much paler below than the male; colors above about as in true *G. ruficauda;* below, in ♂, throat white, slightly washed with pale orange rufous; belly and sides, back of green pectoral band, orange rufous; in ♀, throat white, extensively washed with orange buff; belly and sides, back of green pectoral band, orange buff.

Size.—♂, wing, 85.6; tail, 122; exposed culmen, 56. ♀, wing, 84; tail, 111; exposed culmen, 58.

Remarks.—There is but a very slight individual variation in size, length of bill, and color in this series, and the long bill, great sexual difference in color, and paler under parts in both sexes distinguish the birds of the Santa Marta region as a good subspecies of *G. ruficauda.*

Ramphastos brevicarinatus Gould.

4 specimens, ♂ ♂, ♀ ♀.

Pteroglossus torquatus (Gmel.)

11 specimens, ♂ ♂, ♀ ♀.

Aulacorhamphus calorhynchus Gould.

1 specimen, ♀. Topotype.

Campephilus malherbii Gray.

6 specimens, ♂ ♂, ♀ ♀.

Ceophlœus lineatus (Linn.)

2 specimens, ♂ ♂.

Melanerpes wagleri sanctæ-martæ subsp. nov.

11 specimens, ♂ ♂, ♀ ♀.

Type from Santa Marta, Colombia, No. 5103, coll. of E. A. and O. Bangs. ♂ ad. Collected Feb. 8, 1898, by W. W. Brown, Jr.

Subspecific characters.—Similar to *M. wagleri* of Panama, but much smaller; much more white on inner tail feathers, the inner webs being white to the quill, with three or four small black spots and black tips; much larger than *M. neglectus,* with much longer bill.

Size.—♂, wing, 107.6; tail, 51.6; exposed culmen, 24. ♀, wing, 104; tail, 49.4; exposed culmen, 22.2.

Remarks.—*M. wagleri* of Panama seems to be specifically distinct from *M. subelegans* of Venezuela, the former having the crown patch continuous red from crown to nape, while in the latter the crown patch is broken by brownish between crown and nape. Unfortunately there are no males of *M. neglectus* in the National Museum collection, but this bird is so much smaller than *M. sanctæ-martæ* and has such a very short bill as to be at once distinguished from it. *M. sanctæ-martæ* is a small race of *M. wagleri,* with much more white on the inner pair of tail feathers, the black markings being usually spots, not bars.

Glaucis hirsuta (Gould.)

2 specimens, ♂, ♀.

Phœthornis longirostris (Less. and De Lat.)

1 specimen, ♂.

Phœthornis anthophilus (Bourc. and Muls.)

5 specimens, ♂ ♂, ♀ ♀.

Lampornis violicauda (Bodd.)

3 specimens, ♀ ♀.

Hypuroptila buffoni (Less.)

11 specimens, ♂ ♂, ♀ ♀.

Florisuga mellivora (Linn.)

16 specimens, ♂ ♂, ♀ ♀.

Petasophora delphinæ (Less.)

1 specimen, ♂.

Floricola longirostris (Vieill.)

1 specimen, ♂; altitude 6000 ft.

Thalurania columbica (Bourc.)

12 specimens; 9, ♂ ♂; 3, ♀ ♀.

Amazilia fuscicaudata (Fraser).

9 specimens, ♂ ♂, ♀ ♀.

Amazilia warszeweizi (Cab. and Heine.)

43 specimens, ♂ ♂, ♀ ♀.

Hylocharis cyanea (Vieill.)

12 specimens, ♂ ♂, ♀ ♀. This hummer, so far as I know, has not before been taken in this region.

Nyctidromus albicollis (Gmel.)

3 specimens, ♂ ♂.

Sayornis cineracea (Lafr.)

2 specimens, ♂ and ♀.

Todirostrum nigriceps Scl.

1 specimen, ♀.

Todirostrum schistaceiceps Scl.

1 specimen, ♂.

Euscarthmus impiger Scl. & Salv.

2 specimens, ♂ ♂.

Colopterus pilaris Cab.

2 specimens, ♀ ♀.

Mionectes oleagineus (Licht.)

4 specimens, ♂ ♂, ♀ ♀.

Myiopatis semifuscus (Scl.)

6 specimens, ♂ ♂, ♀ ♀. Topotypes. The specimen from La Guayra, Venez., recorded in Lieut. Robinson's paper, Proc. U. S. Nat. Mus., XVIII, p. 684, as a *Pogonotriccus*, is an example of this species in immature plumage.

Ornithion pusillum (Cab. & Heine.)

1 specimen, ♀.

Tyranniscus griseiceps Scl. & Salv.

1 specimen, ♂.

Elainea pagana (Licht.)

6 specimens, ♂ ♂, ♀ ♀.

Myiopagis placens (Scl.)

3 specimens, ♂ ♂, ♀.

Myiopagis macilvainii (Lawr.)

2 specimens, ♂ and ♀.

Sublegatus glaber Scl. & Salv.

1 specimen, ♂. Wing (2.90 inches), 73.66 mm., corresponding with *S. glaber* and not with the form called *S. platyrhynchus* of which Sclater records a specimen from Santa Marta, Cat. Bds. Brit. Mus., XIV, p. 159.

Myiozetetes texensis colombianus (Cab. and Heine.)

1 specimen, ♀.

Rhynchocyclus sulphurescens (Spix.)

1 specimen, ♂.

Rhynchocyclus flaviventris (Max.)

10 specimens, ♂ ♂, ♀ ♀.

Pitangus derbianus rufipennis (Lafr.)

2 specimens, ♂ ♂.

Myiodynastes audax nobilis (Scl.)

3 specimens, ♂ ♂, ♀.

Megarhynchus pitangua (Linn.)

9 specimens, ♂ ♂, ♀ ♀.

Muscivora mexicana Scl.

3 specimens, ♂ ♂, ♀.

Empidonax virescens (Vieill.)

1 specimen, ♂. Winter resident.

Contopus brachytarsus (Scl.)

1 specimen, ♀.

Myiarchus crinitus (Linn.)

1 specimen, ♀. Winter resident.

Myiarchus erythrocercus Scl. & Salv.

26 specimens, ♂ ♂, ♀ ♀.

Myiarchus ferox (Gmel.)

5 specimens ♂ ♂, ♀ ♀.

Myiarchus nigriceps Scl.

3 specimens, ♂, ♀ ♀.

Tyrannus melancholicus satrapa (Licht.)

7 specimens, ♂ ♂, ♀ ♀.

Milvulus tyrannus (Linn.)

1 specimen, ♂.

Pipra auricapilla Licht.

5 specimens, ♂ ♂, ♀ ♀.

Chiroxiphia lanceolata Wagl.

20 specimens, ♂ ♂, ♀ ♀ and young.

Manacus manacus (Linn.)

8 specimens, ♂ ♂.

Thamnophilus melanonotus Scl.

9 specimens, ♂ ♂, ♀ ♀. Topotypes.

Thamnophilus nævius (Gmel.)

2 specimens, ♂ ♂.

Eriodora intermedia Cab.

3 specimens, ♂ ♂.

Myrmeciza boucardi Berl.

2 specimens, ♂ ♂.

Rhamphocænus rufiventris sanctæ-marthæ Scl.

1 specimen, ♂ ad. Topotype.

Dendroplex picirostris (Lafr.)

4 specimens, ♂ ♂, ♀ ♀.

Dendrocincla olivacea anguina subsp. nov.

1 specimen.

Type from Santa Marta, Colombia, No. 5327, ♂ adult, coll. of E. A. and O. Bangs. Collected Feb. 15, 1898, by W. W. Brown, Jr. Altitude, 5000 ft.

Subspecific characters.—As compared with specimens of true *D. olivacea* from Panama, bill much smaller; wing a trifle longer; tail longer; colors above more olivaceous; wings darker, more olive, less rufous.

Size.—♂, wing, 106.4; tail, 87.2; exposed culmen, 24.

Remarks.—In birds from Nicaragua the bill is still larger than in true *D. olivacea* and the wing considerably shorter. They appear to represent another good subspecies.

Furnarius agnatus Scl. & Salv.

1 specimen, ♂.

Xenops genibarbis Ill.

1 specimen.

Cyanocorax affinis Pelzeln.

9 specimens, ♂ ♂, ♀ ♀.

Cassicus persicus (Linn.)

5 specimens, ♂ ♂, ♀ ♀.

Icterus xanthornus (Linn.)

11 specimens, ♂ ♂, ♀ ♀.

Icterus auricapillus Cassin.

9 specimens, ♂ ♂, ♀ ♀.

Icterus galbula (Linn.)

1 specimen, ♂. Winter resident.

Chrysomitris mexicana (Sw.)

1 specimen, ♂ adult. Perfectly typical of this form.

Chrysomitris columbiana (Lafr.)

1 specimen, ♂ adult. Perfectly typical of this form.

Volatinia jacarini splendens (Vieill.)

2 specimens, ♂ and ♀.

Sycalis browni sp. nov.

2 specimens, ♂ and ♀ young.

Type from Santa Marta, Colombia, No. 5359, ♂ adult, coll. of E. A. and O. Bangs. Collected Feb. 2, 1898, by W. W. Brown, Jr. Altitude 5000 ft.

Specific characters.—♂ adult, size very small; bill slender and small; much white on two outer pairs of tail feathers; wings dusky, edged with greenish yellow; tail dusky, outer feather with the inner web white for its terminal half, second feather with the inner web white for its terminal third; nape and interscapulum dull olive green with dusky markings on shafts of feathers; crown patch shining chrome yellow; rump and upper tail-coverts wax yellow; under parts, from chin to under tail coverts, dull gamboge yellow, slightly more olivaceous on flanks.

Size.—♂ adult, wing, 66.4; tail, 44; exposed culmen, 7.8.

Remarks.—Mr. Brown took at an altitude of 5000 ft. the type of this species, and at 3000 ft., Feb. 19, 1898, a young female in nestling plumage. This new *Sycalis*, which I have named for Mr. Brown, is not closely related to any known species, its very small delicate bill, small size, the great amount of white in its tail feathers, and its peculiar coloring distinguishing it from all others.

Cyanocompsa concreta sanctæ-martæ subsp. nov.

5 specimens, ♂ ♂, ♀.

Type from Santa Marta, Colombia, No. 5361, ♂ adult, coll. of E. A. and O. Bangs. Collected Feb. 2, 1898, by W. W. Brown, Jr. Altitude 3000 feet.

Subspecific characters.—Similar to *C. concreta cyanescens*, but adult male still more decidedly blue, the general color dull grayish blue (intermediate between indigo blue and dull china blue). *Adult female* similar to that of *C. concreta cyanescens*, but duller brown (upper parts nearer bistre than vandyke brown, under parts between light bistre and raw umber).

Size.—♂ adult, length (skins), 143–149.5; wing, 77–82.5; tail, 64.5–68.5; exposed culmen, 17.5–18.5; depth of bill at base, 15.5–16.5; width of mandible at base, 13; tarsus, 20–21; middle toe, 13–15.* ♀ adult, length (skin), 147; wing, 79; tail, 64; exposed culmen, 18.5; depth of bill at base, 16.5; width of mandible at base, 13; tarsus, 20.5; middle toe, 14.†

Remarks.—Mr. Brown obtained five specimens of this form at altitudes of 1800 to 5000 feet.

Zamelodia ludoviciana (Linn.)

5 specimens, ♂ ♂, ♀ ♀. Winter resident.

Spiza americana (Gmel.)

5 specimens, ♂ ♂, ♀ ♀. Winter resident.

Arremonops conirostris canens subsp. nov.

3 specimens, ♂, ♀ ♀.

Type from Santa Marta, Colombia, No. 5371, ♂ adult, coll. of E. A. and O. Bangs. Collected Jan. 15, 1898, by W. W. Brown, Jr.

Subspecific characters.—Smaller than *A. conirostris;* wings and tail darker, more dusky, less greenish; back much grayer, the feathers tipped and edged with gray; nape and head between the black stripes clear gray without any olive or greenish.

Size.—♂ adult, wing, 76.2; tail, 64.6; exposed culmen, 14; ♀ adult, wing, 66; tail, 57; exposed culmen, 14.

Remarks.—*A. conirostris canens* differs so much in color from true *A. conirostris* besides being considerably smaller, that it may prove to be a distinct species, though for the present I prefer to treat it as a subspecies.

Saltator magnus (Gmel.)

1 specimen, adult ♂. This one example is not at all typical, and if others from the same region are found to agree with it, the form deserves separation as a subspecies.

Saltator striatipectus Lafr.

1 specimen, ♂ adult.

Arremon schlegeli Bp.

5 specimens, ♂ ♂, ♀ ♀.

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* Four specimens.

† One specimen.

Emberizoides macrurus (Gmel.)

1 specimen, ♂. The type locality of *E. macrurus* is Cayenne. The one Santa Marta specimen differs from birds from that region in having yellow instead of white throat, being richer in color throughout and in having a shorter wing. Should other specimens bear out these characters, then the Santa Marta bird must be separated as a subspecies.

Euphonia trinitatis Strick.

1 specimen, ♂.

Euphonia crassirostris Scl.

27 specimens, ♂ ♂, ♀ ♀ and young.

Calospiza desmaresti (Gray).

5 specimens, ♂ ♂.

Calospiza sp.?

1 specimen, ♀. I have been unable to identify this skin. The bird has a very large, thick bill and may represent a new species. A good male specimen is necessary, however, before this can be settled.

Tanagra cana Sw.

23 specimens, ♂ ♂, ♀ ♀.

Tanagra palmarum melanoptera (Hartl.)

1 specimen, ♂.

Ramphocelus dimidiatus Lafr.

25 specimens, ♂ ♂, ♀ ♀ and young ♂ ♂.

Piranga rubra (Linn.)

7 specimens, ♂ ♂, ♀ ♀. Winter resident.

Piranga faceta sp. nov.

2 specimens, ♂ adult, ♀ adult.

Type from Santa Marta, Colombia, No. 5452, ♂ adult, coll. of E. A. and O. Bangs. Collected Feb. 4, 1898, by W. W. Brown, Jr. Altitude 3000 ft.

Specific characters.—♂, size rather small (about the size of *P. hæmalea*); tail long; bill very small, much smaller than that of *P. hæmalea* or *P. testacea*, and not so swollen; tooth on edge of upper mandible very prominent; upper parts deep brownish red, more intense (shading towards dark carmin) on head; wings dusky, the feathers edged with dark red, without wing bars; under parts bright orange vermilion, browner on flanks and more scarlet on throat; ♀ slightly smaller than the ♂; colors above deep olive green, sides of forehead more yellow; below bright olive yellow, shaded with olive on sides and flanks.

Size.—♂ adult, wing, 89; tail, 76; exposed culmen, 16.6; breadth of bill at nostril, 8.2. ♀ adult, wing, 85.8; tail, 72.6; exposed culmen, 16; breadth of bill at nostril, 8.2.

Remarks.—On Feb. 4, 1898, Mr. Brown took a pair of this beautiful new tanager, the female at 4000 ft. and the male at 3000 ft. *P. faceta* scarcely needs comparison with any other form, its bright orange vermilion under parts and small bill at once distinguishing it from *P. testacea* or *P. hæmalea.*

Eucometis cristata (Du Bus.)

6 specimens, ♂ ♂, ♀ ♀.

Stelgidopteryx uropygialis (Lawr.)

6 specimens, ♂ ♂, ♀ ♀.

Cyclarhis flavipectus canticus subsp. nov.

5 specimens, ♂ ♂, ♀ ♀.

Type from Santa Marta, Colombia, No. 5462, ♂ adult, coll. of E. A. and O. Bangs. Collected Jan. 28, 1898, by W. W. Brown, Jr.

Subspecific characters.—Similar to true *C. flavipectus* of Trinidad, but slightly smaller; wing shorter; color of throat and breast much purer, deeper, more golden, less greenish yellow, being in *C. canticus* nearly pure canary yellow.

Size.—♂ adult, wing, 75.2; tail, 58; exposed culmen, 17. ♀ adult, wing, 72.4; tail, 61; exposed culmen, 16.6.

Remarks.—This is the form over which there has been so much discussion. Count Von Berlepsch, Ibis, 1888, p. 85, first noticed the differences, saying "specimens of *C. flavipectus* from Bogota generally show a much purer and deeper golden yellow on the under parts than those from Venezuela and Trinidad." Santa Marta skins seem even more strongly to show these differences than Bogota skins. Dr. J. A. Allen, in Bull. Am. Mus., Vol. II, p. 130, June, 1889, renamed the Trinidad bird, calling it *C. flavipectus trinitatis.* Mr. Frank M. Chapman, when he corrected this mistake in his list of Trinidad birds, Bull. Am. Mus., Vol. VI, p. 27, 1894, referred the Colombia birds to the Costa Rican form *C. subflavescens,* from which they appear to me to be perfectly distinct.

Vireo chivi agilis (Licht.)

8 specimens, ♂ ♂, ♀ ♀.

Hylophilus aurantiifrons Lawr.

4 specimens, ♂ ♂, ♀ ♀.

Hylophilus flavipes Lafr.

5 specimens, ♂ ♂, ♀ ♀.

Dacnis napæa sp. nov.

2 specimens, adult ♂, young ♂, in plumage like that of ♀.

Type from Santa Marta, Colombia, No. 5478, ♂ adult, coll. of E. A. and O. Bangs. Collected Jan. 18, 1898, by W. W. Brown, Jr.

Specific characters.—Adult ♂, about the size of *D. cœrebicolor* or rather larger; wing about the same or longer; bill much larger—longer and stouter; color pattern the same; the blue color an intense cobalt blue, very different from the dark purplish blue of *D. cœrebicolor;* feet flesh color.

Size.—♂ adult, wing, 69; tail, 47; exposed culmen, 7.6.

Remarks.—*D. napæa* needs comparison with but one species, *D. cœrebicolor.* This comparison I have been able to make, the National Museum having a considerable series of Bogota skins. The very large bill and bright blue color of *D. napæa* mark the Santa Marta bird as specifically distinct from the small-billed dark purplish blue *D. cœrebicolor* of Bogota.

Arbelorhina cyanea eximia (Caban.)

15 specimens, ♂ ♂, ♀.

Arbelorhina cœrulea microrhyncha Berl.

42 specimens, ♂ ♂, ♀ ♀ and young.

Coereba luteola (Caban.)

6 specimens, ♂ ♂, ♀ ♀.

Mniotilta varia (Linn.)

1 specimen, ♀. Winter resident.

Protonotaria citrea (Bodd.)

21 specimens, ♂ ♂, ♀ ♀. Winter resident.

Helminthophila peregrina (Wils.)

1 specimen, ♂. Winter resident.

Compsothlypis pitiayumi pacifica (Berl.)

2 specimens, ♀ ♀.

Dendroica æstiva (Gmel.)

3 specimens, ♂ ♂, ♀. Winter resident.

Seiurus motacilla (Vieill.)

1 specimen, ♂. Winter resident.

Geothlypis formosa (Wils.)

1 specimen, ♂. Winter resident.

Basileuterus mesochrysus Scl.

5 specimens, ♂ ♂, ♀ ♀.

Basileuterus cabanisi Berl.

1 specimen, adult ♂. This is apparently a rare bird in collections.

Setophaga ruticilla (Linn.)

2 specimens, ♂, ♀. Winter resident.

Thryophilus minlosi Berl.

2 specimens. ♂ ad., ♂ yg.

Polioptila bilineata (Bonap.)

1 specimen, ♀ adult.

Turdus aliciæ Baird.

2 specimens, ♂ ♂. Winter resident.

Merula incompta sp. nov.

4 specimens, ♂ ♂, ♀ ♀.

Type from Santa Marta, Colombia, No. 5560, ♀ adult, coll. of E. A. and O. Bangs. Collected Jan. 22, 1898, by W. W. Brown, Jr.

Specific characters.—Size rather small; sexes alike; bill yellow above and below, darker at base; no eye stripe; 4th and 5th primaries nearly equal and longest, 3rd and 6th nearly equal, next, 2nd and 7th equal; legs, feet and claws pale brownish; color above uniform rich olive brown, including lores, ear-coverts, tail and wings, except primaries and inner webs of secondaries, which are more dusky; below, breast and sides olivaceous wood brown; center of belly and under tail-coverts clear buff; throat dull whitish with pale olive brown streaks; under wing-coverts dull orange buff.

Size.—♀ adult, wing, 112.6; tail, 91; exposed culmen, 20. ♂ adult, wing, 114.6; tail, 92.6; exposed culmen, 19.8.

Remarks.—The Santa Marta thrush is most like *M. gymnophthalmus* in general coloration, but can be told from that species by not having the naked eye spots and the under tail-coverts not being streaked. The only other species that it needs to be compared with is *M. ignobilis*, from which its smaller size, yellow bill, and many differences in detail of coloration at once distinguish it.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

DESCRIPTIONS OF NEW SQUIRRELS FROM MEXICO AND CENTRAL AMERICA.

BY E. W. NELSON.

During explorations made in Mexico and parts of Central America for the Biological Survey, U. S. Department of Agriculture, an extraordinarily fine series of squirrels has been secured. The collection contains topotypes of all but two or three of the large number of species described from Mexico, besides specimens from scores of widely scattered localities. After my return from the field a few months ago, Dr. C. Hart Merriam, Chief of the Biological Survey, who had already done some work on the group, generously placed this rich material in my hands for elaboration. In order that I might cover the ground more satisfactorily, Mr. F. W. True, Executive Curator of the U. S. National Museum, placed the entire Museum series of tropical American Squirrels at my disposal, and Dr. J. A. Allen, Curator of Mammals in the American Museum of Natural History, New York, loaned me the series in the collection under his charge. Without the material furnished by Dr. Allen and Mr. True I could not have reached satisfactory conclusions concerning the Central American species, and I wish to express my appreciation of their kindness.

I am also under special obligations to Mr. Oldfield Thomas, Curator of Mammals in the British Museum, for his courtesy in comparing specimens in our collection with type specimens in the British Museum, thus identifying Gray's numerous names with forms from known localities, and furnishing a safe basis for future work.

Revisers of tropical American Squirrels have hitherto worked at great disadvantage, owing to scanty and unsatisfactory material. The collections studied in the present connection contain over six hundred and fifty specimens from Mexico and Central America, besides many from the United States and South America. The large number of topotypes in these collections, together with my personal knowledge of the geographical features of the area covered, have rendered it a comparatively simple matter to disentangle the complications of synonymy that have puzzled former workers. It was a surprise to find that while many of the old names apply to perfectly valid species or subspecies, a considerable number of forms remain to be described. As it will be some time before my revision of the group can be published, it seems advisable to describe the new species and subspecies in this preliminary paper.

Sciurus richmondi sp. nov. Richmond's Squirrel.

Type from Escondido River, Nicaragua. No. $\frac{36481}{48851}$, ♀ ad., U. S. Nat. Mus., Biological Survey Coll. Collected October 4, 1892, by Chas. W. Richmond. Orig. No. 118.

Distribution.—Bluefields and Escondido River region.

Characters.—A small squirrel resembling *S. æstuans*, but back darker brown, lower surface richer, more reddish-fulvous; tail narrow, black, thinly washed with dull fulvous. 1 upper premolar.

Color.—Upper parts from nose to base of tail, including upper surface of fore and hind feet, finely grizzled black and dark fulvous, the fulvous brightest and inclining to rusty on sides of neck and thighs; eyes surrounded by a dull fulvous ring; cheeks dingy grizzled-fulvous, paler than top of head; a small patch of dull fulvous fur behind base of ears. Under parts varying from dingy fulvous to bright reddish-buffy, usually brightest on neck and breast. Anal region and base of tail all round like back; rest of upper surface of tail black, thinly washed with dingy fulvous; under side of tail with a median band of grizzled black and dull rufous, bordered by a blackish band and edged with fulvous.

Measurements.—Type specimen: Total length 384; tail vertebræ 181; hind foot 53.5. Average of 5 adults: Total length 368.6; tail vertebræ 178; hind foot 50.3.

Remarks.—In summer pelage the lower surface is deeper colored than in winter, but there appears to be no other seasonal difference. Individual variation is not marked; the intensity of the fulvous above and below varies from a dingy to a bright reddish-buffy, and there is no trace of whitish or gray on any of the twenty specimens examined. The upper surfaces of the feet are sometimes like the back and sometimes a little brighter fulvous; the ears are scantily covered with short dark hairs.

S. richmondi has a superficial resemblance to *S. deppei*, but is darker and the gray is replaced by fulvous or reddish-buffy.

From *S. æstuans hoffmanni*, to which it is most closely related, it may be readily distinguished by the paler under surface, and especially by the dull fulvous wash, instead of the rich bright rufous on the tail. The general color of dorsal surface is much the same in both, and in intensity of lower surface *richmondi* sometimes approaches closely to *hoffmanni*. The difference between the color edging the tail appears to be constant. So far this species is known only from the lower Escondido River, above Bluefields, Nicaragua, but it undoubtedly has a much wider range. It is probable that when the intermediate country between the known ranges of *S. richmondi* and *S. æstuans hoffmanni* is worked they will be found to intergrade, in which case *S. richmondi* will become a subspecies of *S. æstuans*. This squirrel is named in honor of Dr. Chas. W. Richmond, Assistant Curator of Birds in the U. S. National Museum, who collected the series upon which the description is based.

Sciurus negligens sp. nov. Tampico Squirrel.

Type from Alta Mira, Tamaulipas, Mexico. No. 93028, ♀ ad., U. S. Nat. Mus., Biological Survey Coll. Collected April 18, 1898, by E. A. Goldman. Orig. No. 12319.

Distribution.—State of Tamaulipas, Mexico (from Tampico to Victoria).

Characters.—Size of *S. deppei*, to which it is closely related. Above fulvous-olive-gray; below white, often shading to pale buffy posteriorly. Forelegs and shoulders gray; tail rather full, black, washed with white on upper surface. 1 upper premolar.

Color.—Upper parts from nose to base of tail, including upper surface of hind feet, finely grizzled black and pale olivaceous-fulvous, brightest on flanks and thighs. Sides of head and neck dingy grizzled gray and fulvous; ears slightly rufous; an indistinct ring of pale dull fulvous around eyes. Lower surface white, nearly pure on chin, throat and breast, becoming grayer or shaded with buffy posteriorly. Tops of fore feet, forelegs and shoulders gray; inside of legs paler gray; a gray border sometimes extending from forelegs back along flanks and side of hind legs separating grizzled dorsal area from the paler lower surface. Anal region and base of tail all round like back. Upper surface of tail black, washed with white, the pale yellowish-brown basal color showing through; median band on under surface grizzled pale buffy and black, the buffy predominating and bordered by a black band; a thin edging of white around border. Small patch of white and pale buffy fur behind base of ears.

Measurements.—Type specimen: Total length 403; tail vertebræ 195; hind foot 55.

Sciurus alleni sp. nov. Allen's Squirrel.

Type from Monterey, Tamaulipas, Mexico. No. $\frac{25731}{33131}$, ♂ ad., U. S. Nat. Mus., Biological Survey Coll. Collected Feb. 22, 1891, by C. P. Streator. Orig. No. 563.

Distribution.—Nuevo Leon and Tamaulipas, Mexico.

Characters.—Size and general appearance much like pale specimens of *Sciurus carolinensis fuliginosus;* forelegs and tops of fore and hind feet grayish white; tail bushy, black, washed with white above. 1 upper premolar.

Color.—Entire upper parts, except upper surface of feet and forelegs, finely grizzled with grayish-white, dark fulvous and black; the fulvous darkest on crown and rump, but differing slightly in shade on rest of upper surface. Sides of body and thighs somewhat grayer than back; forelegs to body and fore and hind feet grayish-white, the hairs having black bases and whitish tips; a small indistinct patch of fulvous sometimes present in middle of gray on upper surface of hind foot. Under surface of body pure white. Eyes surrounded by ring of pale fulvous; ears like top of head except for a pale, dingy-fulvous patch behind base in some specimens. Tail moderately bushy, washed with white on upper surface with black and dark fulvous showing through; below a broad median band of dark fulvous grizzled with black and bordered on sides by a narrow band of black; edged externally with white.

Cranial characters.—The skull of this species is most like that of *S. oculatus*, from which it differs in smaller size, slightly stouter rostrum, and larger foramen ovale.

Measurements.—Type specimen: Total length 466; tail vertebræ 220; hind foot 63. Average of five adults: Total length 475; tail vertebræ 223.8; hind foot 62.6.

Remarks.—The little variation in the series before me appears to be purely individual and is produced by the slightly varying intensity of the fulvous. The series examined consists of winter and spring specimens. Its nearest Mexican relative is *S. oculatus*, from which it is perfectly distinct. In size and color it is most like the form of *Sciurus carolinensis*, found in northern and eastern Texas, but the grayish white feet and absence of second premolar serve to distinguish it at once. The absence of the second premolar throws it with *S. arizonensis* and *S. oculatus*, from which its much smaller size, the grizzled blackish-fulvous upper surface, and grayish white feet distinguish it. The lack of a second premolar and darker and much finer grizzled dorsal surface distinguish it sharply from *S. yucatanensis.*

S. alleni is a well-defined species of the Arid Tropical zone and is restricted to a portion of the Tamaulipan faunal district.

I take pleasure in dedicating this species to Dr. J. A. Allen, Curator of Mammals in the American Museum of Natural History, New York.

Sciurus oculatus tolucæ subsp. nov. Toluca Squirrel.

Type from north slope of Volcano of Toluca, Mexico, Mex. No. 55927, ♂ ad., U. S. Nat. Mus., Biological Survey Coll. Collected Sept. 8, 1893, by E. W. Nelson and E. A. Goldman. Orig. No. 5419.

Distribution.—Pine and fir forests on north slope of Volcano of Toluca, and thence north on adjacent east slope of mountains in State of Mexico to mountains of central Queretero and Guanajuato, and perhaps reaching the mountains of southwestern San Luis Potosi.

Characters.—A large squirrel, differing from typical *S. oculatus* in not having a black dorsal area and in having tops of feet and entire lower surface whitish or very pale fulvous. 1 upper premolar.

Color.—Similar to *S. oculatus*, but without any definite black area on upper surface and always white or nearly white below. The dorsal surface is darker than the sides, and the fulvous shade, which is barely perceptible on dorsal surface of typical *S. oculatus*, becomes distinct on crown and middle of back. Ear patches uniformly dirty whitish. Tops of feet vary from whitish to pale buffy; ring around eyes dingy whitish with a buffy shade at outer border.

Measurements.—Type specimen: Total length 565; tail vertebræ 266; hind foot 72.

Remarks.—Typical *Sciurus oculatus* Peters, of which *Sciurus melanonotus* Thomas is a synonym, is a common species of the pine forests in the mountains along the eastern border of the Mexican tableland from Mt. Orizaba, Puebla, to eastern San Luis Potosi.

Sciurus goldmani sp. nov. Goldman's Squirrel.

Type from Huehuetan, Chiapas, Mexico. No. 77903, ♂ ad., U. S. Nat. Mus., Biological Survey Coll. Collected Feb. 28, 1896, by E. W. Nelson and E. A. Goldman. Orig. No. 9435.

Distribution.—Pacific Coast lowlands of Guatemala, ranging north to Huehuetan, Chiapas, Mexico.

Characters.—A large slender species with coarse harsh hair, resembling *S. colliei.* Upper surface dark iron-gray; lower surface white; ears black rimmed, rufous-tufted, with large white patch behind base; tail long, slender, above black washed with white. 2 upper premolars.

Color.—*Winter pelage* (Huehuetan): Upper surface from nose to base of tail, including flanks, outer side of forelegs and thighs, coarsely grizzled black and pale fulvous gray, the fulvous sometimes becoming intensified to a dull orange-buffy. There is usually a thin black wash over dorsal surface, which becomes decidedly heavier on some specimens, with the pale buffy-yellow showing through. Sides of head a little paler than back; ears dingy grayish on inner side and edged with black; a scanty tuft of dark ferruginous hairs on back of ear and a large, conspicuous patch of white behind base; a small but distinct white spot on side of head just below ear. Tops of toes dingy whitish; tops of feet pale iron gray. Upper surface of tail basally like back, rest black thinly washed with white; below grizzled black and gray, dull fulvous or orange-buffy. Under side of body and inside of legs white. Under fur on back dark plumbeous, on ventral surface white or pale plumbeous.

Measurements.—Type specimen: Total length 520; tail vertebræ 264; hind foot 65. Average of 5 adults: Total length 546.8; tail vertebræ 283.8; hind foot 66.6.

Remarks.—In general appearance this species is very similar to *S. colliei*, from which it may be distinguished by the distinct black borders and large basal white patches of the ears; the extension of color of back over outside of legs and thighs and the decidedly white upper surface of feet and toes. The under fur is darker on back, with scarcely a trace of lighter tips, and whiter on belly. The back and sides are the same in *goldmani* but for a little heavier wash of black on middle of back. The most intensely colored specimens are as buffy on dorsal surface as the brightest specimens of *S. colliei*, but this added shade of buffy is brightest on nape and ears in *colliei* and on the rump of *goldmani*. The ears of *colliei* are uniform or differ but little in color, while in *goldmani* the varied markings are strong characters.

This species is named in honor of my field assistant, Mr. E. A. Goldman, to whose faithful aid is due much of the success of our explorations in Mexico.

Sciurus boothiæ managuensis subsp. nov. Managua Squirrel.

Type from Managua River, Guatemala. No. 62476, ♂ ad., U. S. Nat. Mus. Coll. Collected Feb. 12, 1895, by Mrs. C. McElroy.

Distribution.—Managua River, eastern Guatemala.

Characters.—Smaller than typical *S. boothiæ*, with coarse, harsh hairs; blackish yellow on dorsal surface, buffy-yellow below. 2 upper premolars.

Color.—Above, including top of head, outside of legs, flanks and base of tail, grizzled black and dingy fulvous, rather grayish; top of head and back washed with black, the subterminal yellowish showing through; legs usually deeper yellowish, in marked contrast; top of feet shading into grizzled buffy. Sides of nose, cheeks, chin, and sometimes throat, dingy grayish with a dull fulvous shade; rest of lower parts bright buffy-yellow. Ears distinctly margined with black, a conspicuous patch of buffy-yellow fur behind base and a thin tuft of rufous hairs near tip. Tail flattened and rather narrow: above, black washed with white; below, grizzled with grayish-fulvous along middle with a band of black along each side, heaviest at tip and bordered externally with white.

Measurements.—Type specimen: Total length 512.5; tail vertebræ 250.5; hind foot 57.

Remarks.—Among the four specimens examined two agree closely in color with the type, the other, apparently immature, is much grayer above and the color of the back extends down on the legs to the feet, the latter being washed with buffy; below it is dingy-buffy.

Sciurus albipes quercinus subsp. nov. Oak Woods Squirrel.

Type from mountains on west side of Valley of Oaxaca, Oaxaca, Mexico. No. 68202, ♀ ad., U. S. Nat. Mus., Biological Survey Coll. Collected Sept. 15, 1894, by E. W. Nelson and E. A. Goldman. Orig. No. 6768.

Distribution.—The pine and oak forests on mountains along western side of Valley of Oaxaca, Oaxaca, Mexico.

Characters.—Size of *S. albipes*, but differs in having the back grizzled yellowish-gray, and the lower surface white or sometimes pale buffy. 2 upper premolars.

Color.—Very similar to *S. albipes nemoralis* from mountains near Patzcuaro, Michoacan, but differing in paler, more yellowish-white dorsal surface; median band on under side of tail commonly buffy or reddish fulvous, bordered with the usual black band edged externally with white. No melanistic phase.

Measurements.—Type specimen: Total length 550; tail vertebræ 285; hind foot 70. Average of five adults: Total length 545.6; tail vertebræ 274.8; hind foot 69.8.

Remarks.—Some specimens are very close to *S. albipes nemoralis* and have the under side of tail nearly as gray as in that form. The feet and under parts are usually white, varying to buffy or fulvous on one out of every 4 or 5 specimens. This is not a strongly defined race, but the characters given are sufficient to distinguish most specimens without difficulty, and in view of its isolation from its nearest related form it appears worthy of recognition.

Sciurus albipes nemoralis subsp. nov. Michoacan Squirrel.

Type from Patzcuaro, Michoacan, Mexico. No. $\frac{85358}{47623}$, ♂ ad., U. S. Nat. Mus., Biological Survey Coll. Collected July 23, 1892, by E. W. Nelson and E. A. Goldman. Orig. No. 2905.

Distribution.—Sierra Madre, southeast of the Sierra Nevada de Colima, Jalisco, to Volcano of Toluca, State of Mexico (Nahautzin and Patzcuaro, Michoacan and Volcano of Toluca).

Characters.—Size of *S. albipes*, but differs in having back of a clearer iron-gray; lower surface white; under side of tail gray or fulvous-gray. 2 upper premolars.

Color.—Top of nose and crown blackish or dark iron-gray, rest of dorsal surface, including outside of fore and hind legs, grizzled black, gray, or grayish white with an indistinct mixture of dingy fulvous; the fulvous mixture darkest on nape and rump, forming poorly defined patches varying in intensity and sometimes scarcely appreciable; outside of legs and flanks grayer than middle of back; feet white; ears like crown, with conspicuous white patch behind base; eyes surrounded by dull grayish-fulvous ring; cheeks and sides of nose grizzled gray with dingy fulvous shade; lower surface of body white. Base of tail, above like rump, below grizzled gray; rest of upper surface black, heavily washed with white; lower surface with broad median band of grizzled gray or pale fulvous-gray and black, bordered by a band of black and edged externally with white; on some specimens the lower surface of tail is washed with white.

Measurements.—Type specimen: Total length 560; tail vertebræ 295; hind foot 70. Average of 5 adults: Total length 550.6; tail vertebræ 280.6; hind foot 70.

Sciurus albipes colimensis subsp. nov. Colima Squirrel.

Type from the Hacienda Magdalena, Colima, Mexico. No. $\frac{33197}{45202}$, ♂ ad., U. S. Nat. Mus., Biological Survey Coll. Collected March 19, 1892, by E. W. Nelson and E. A. Goldman. Orig. No. 2239.

Distribution.—Arid tropical forests of Colima, ascending river valleys to Plantinar, Jalisco. Ranging from sea level to 3000 feet.

Characters.—A little smaller, slenderer, and tail narrower than *S. albipes*, from which it differs in having distinct nape and rump patches; rest of back clearer and lighter gray; tops of feet iron-gray; under surface of body white; under surface of tail grizzled iron-gray. 2 upper premolars.

Color.—Upper surface, including tops of fore and hind feet, excepting nape and rump patches, grizzled white or gray and black with a scanty intermixture of rusty or buffy-rufous. Under fur tipped with gray or fulvous according to color on longer hairs. Nose and fore part of crown usually blacker than back; ears similar to nape with patch of dingy white behind base; eyes surrounded with dingy whitish ring; side of nose and cheek to behind eyes gray, sometimes tinged with buffy on cheeks. Tops of feet vary from dark iron-gray to grayish white. Nape and rump patches generally very distinct, and vary from dark rufous to bright rusty-red or dark reddish-buffy, and sometimes dull fulvous. Lower surface of body white. Anal region and base of tail below like middle of back; top of tail at base like rump patch; rest of upper surface of tail black heavily washed with white; below a grizzled iron-gray median band narrowly bordered by band of black and edged externally with grayish white. Tail rather narrow.

Measurements.—Type specimen: Total length 525; tail vertebræ 260; hind foot 65. Average of 5 adults: Total length 522; tail vertebræ 267; hind foot 67.6.

Sciurus albipes effugius subsp. nov. Guerrero Squirrel.

Type from mountain near Chilpancingo, Guerrero, Mexico. No. 70288, ♀ ad., U. S. Nat. Mus., Biological Survey Coll. Collected Dec. 24, 1894, by E. W. Nelson and E. A. Goldman. Orig. No. 7271.

Distribution.—High pine region of the Cordillera del Sur, near Chilpancingo, Guerrero, Mexico.

Characters.—Size of *S. albipes*, from which it differs in the strongly marked nape patch, unusually large, conspicuous patches of white behind base of ear and rich rufous color on under side of tail. 2 upper premolars.

Color.—*Winter pelage:* Upper surface from nose to base of tail, excepting nape patch and tops of fore and hind feet, grizzled grayish white, black, and rufous, the latter color usually obscured by the overlying grayish. Top of head and nape occupied by a well-marked patch of dark rufous, almost chestnut, washed with black; nape patch shading into a duller colored area extending below eyes on sides of head and neck and surrounding ears; rump patch absent or reduced to small area at base of tail, same color as nape. Ears grizzled grayish or dull rusty rufous on inner side; behind rufous or rusty gray anteriorly, posteriorly covered with long white fur, forming part of the conspicuous white patch behind base. Eyes surrounded by rings of fulvous and whitish; sides of nose and lower part of cheeks gray, varying in intensity. Tops of fore and hind feet white, shading through gray on legs to color of body. Anal region and base of tail all round like adjacent part of rump. Upper surface of tail black, washed with white, the bright rufous basal color sometimes showing through; below a median band of deep, rich rufous with scarcely a trace of dark grizzling, but bordered on each side by narrow band of black, edged with white. Chin white; sides of throat sometimes shaded with same; anal region gray; rest of lower parts deep rich rufous, very uniform in the series before me.

Measurements.—Type specimen: Total length 502; tail vertebræ 247; hind foot 68. Average of 5 adults: Total length 496.8; tail vertebræ 249; hind foot 68.

Remarks.—An old female in worn fur taken with the other specimens the last of December may represent the summer pelage. The rump patch is as conspicuous as the nape patch and agrees with it in color. The tops of fore and hind feet are dark gray; inside of legs dingy whitish shading into the dull whitish-rufous that covers throat, breast, and abdomen except ring of white around mammæ; chin white. The lower surface of tail is darker rufous than body and distinctly grizzled with black. Top of nose and area between nape and rump patches grizzled gray, black, and rusty rufous, the gray most conspicuous.

Among five adult winter specimens in the perfect pelage described above one is darker than the others on dorsal surface, owing to an increase in amount of black on tips of hairs. Another specimen has the rufous of under surface extending up on sides behind fore legs and uniting with a backward extension of the nuchal patch much like *S. aureogaster*. The rest of dorsal surface is less heavily grizzled with gray than usual and rusty-red predominates, so that the prevailing shade is dull rusty-red thinly grizzled with grayish white. The white on tops of feet is washed with reddish. Two half-grown young taken the last of December are in the same pelage as the adults, agreeing with the average adults except in having only the toes white and rest of feet gray. The nearest ally of this subspecies appears to be typical *S. albipes*. The white ear patches are more conspicuous than in any Mexican squirrel known to me.

Sciurus nelsoni hirtus subsp. nov. Popocatepetl Squirrel.

Type from Tochimilco, Puebla, Mexico. No. 55325, ♂ ad., U. S. Nat. Mus., Biological Survey Coll. Collected Aug. 7, 1893, by E. W. Nelson and E. A. Goldman. Orig. No. 5295.

Distribution.—Volcanoes of Iztaccihuatl and Popocatepetl, in States of Mexico and Puebla, Mexico.

Characters.—Size of *S. nelsoni*, but distinguished by distinct patches of dingy fulvous on nape and rump; by iron-gray color on middle of back and dingy rufous on under side of body. Ears and feet dark iron-gray. 2 upper premolars.

Color.—Dorsal surface from nose to base of tail, including tops of fore and hind feet, excepting nape and rump patches, finely grizzled with black and gray, the latter obscurely mixed with dull fulvous; gray of crown, nape, and rump mostly replaced by fulvous, thus producing distinct patches of dull dingy fulvous grizzled with black. Ears like nuchal area, with distinct patch of white fur behind base; chin dingy gray. Lower surface, including inside of forelegs and thighs, dark dingy rufous. Upper surface of tail black heavily washed with white; median band on lower surface varying from grizzled black and pale fulvous gray to black and rich buffy-fulvous; with a heavy band of black on each side edged externally with white. The tail has a remarkably broad full brush.

Measurements.—Type specimen: Total length 498; tail vertebræ 243; hind foot 67. Average of five adults: Total length 514.2; tail vertebræ 256.8; hind foot 68.

Sciurus aureogaster frumentor subsp. nov. Perote Squirrel.

Type from Las Vigas, Vera Cruz, Mexico. No 54259, ♂ ad., U. S. Nat. Mus., Biological Survey Coll. Collected June 18, 1893, by E. W. Nelson and E. A. Goldman. Orig. No. 5073.

Distribution.—East slope of Cofre de Perote, Vera Cruz, Mexico, from near Las Vigas (7500 ft.) to Jico and Jalapa (4400 ft.).

Characters.—Size of *S. aureogaster*, from which typical specimens differ in having very distinct rufous patches on nape and rump, and grizzled gray lower surface. 2 upper premolars.

Color.—Summer pelage (Las Vigas): Top of nose and fore part of crown grizzled black and gray, sometimes slightly mixed with fulvous; nape and rump patches large and conspicuous, varying from dark orange-buffy to dark ferruginous; rest of back and sides, including tops of feet and legs, grizzled black and gray, or black, gray, and orange-buffy, the gray overlying the other colors. Tops of feet darker than back and usually blackish, thinly grizzled with gray. Ears generally like nape patch, but often grizzled with gray and sometimes with a whitish tuft behind base; narrow ring of dingy buffy round eye. Side of head between eye and ear, up to border of nape patch in front of ear, dark, dingy orange-buffy. Lower surface dingy grizzled black and gray nearly as on back, but paler on chin, lower cheeks, throat, and breast. Base of tail all round like rump. Upper surface of tail black, washed with white; below with a dark rufous median band broadly bordered on each side by black and edged externally with white.

Measurements.—Type specimen: Total length 500; tail vertebræ 253; hind foot 69. Average of 5 adults: Total length 504.6; tail vertebræ 249.8; hind foot 68.6.

Remarks.— Winter pelage: Two specimens taken in April at Jalapa are in winter pelage and differ from the large series of summer skins taken at Las Vigas and Jico in the greater amount of gray on the dorsal surface.

This overlies and obscures the nape and rump patches; the feet also are grayer. The under surface varies from grizzled gray to gray washed with dull rufous, and in two summer specimens from Las Vigas is dingy ferruginous In the series of 25 specimens from Jico and Jalapa only two are distinctly gray below and three are dingy reddish, washed with grayish. All of the others are intense ferruginous, which in some specimens extends up on sides, behind the forelegs, almost as in true *aureogaster.* The nape and rump patches, while averaging less uniformly distinct than in Las Vigas specimens, are almost invariably strongly marked and separate these specimens from true *aureogaster.* There is a tendency for the gray to extend over the nape and rump and so obscure these patches. The base and upper part of the tail is as in Las Vigas specimens; below the black lateral bands are broader and often reduce the rufous central stripe to a narrow streak on basal half. The rufous on tail is deeper than in Las Vigas specimens, varying from deep orange rufous to ferruginous. These specimens are intergrades between *frumentor* and true *aureogaster,* but the presence of distinct rump patches places them nearest *frumentor.* No melanistic phase is known.

Sciurus socialis cocos subsp. nov. Acapulco Squirrel.

Type from Acapulco, Guerrero, Mexico. No. 70644, ♂ ad., U. S. Nat. Mus., Biological Survey Coll. Collected Jan. 11, 1895, by E. W. Nelson and E. A. Goldman. Orig. No. 7360.

Distribution.—Pacific Coast district of Guerrero and adjacent part of Oaxaca (from Acapulco to Jamiltepec), Mexico.

Characters.—Distinguished from all Mexican squirrels by the sharp contrast between the bright rufous patches on nape and rump and the unusually pale or whitish color on rest of dorsal surface. 2 upper premolars.

Color.—Upper parts from nose to base of tail, except feet and patches on nape and rump, grizzled grayish-white, sometimes with slight mixture of rufous; darkest on nose and fore part of crown; on back and flanks, between the nape and rump patches, often almost white, contrasting strikingly with sharply defined patches on nape and rump, which vary from dark almost chestnut-rufous to deep orange-buffy, washed lightly with black. Eyes surrounded by dull fulvous ring in the middle of a fulvous or reddish-brown area which extends back on sides of head to ears and joins rufous nuchal patch on crown just in front of ears. Ears like nuchal patch, with a small patch of rufous or buffy fur behind base. Sides of nose and lower parts of cheeks grayish-white, this color often extending up to lower border of ears and back along sides of neck. Tops of feet white or pale grayish-white; chin white; rest of lower parts varying from white to pale creamy-buffy or rich buffy-rufous. Base of tail above like rump patch; below with anal region like middle of back; rest of tail on upper surface black, heavily washed with white with the rufous or orange-red under color showing through; below the median band varies from deep rufous to orange-rufous with a narrow black border edged externally and often more or less overlaid with white; sometimes heavily washed with white below and above. The amount of white on tail agrees with purity of white on dorsal surface.

Measurements.—Type specimen: Total length 506; tail vertebræ 261; hind foot 67. Average of 5 adults: Total length, 515.4; tail vertebræ 263.2; hind foot, 67.

Remarks.—The most common or typical forms of this extremely variable squirrel are described above. They are notable among all of the species and races of the group having nape and rump patches for the sharp contrast between the rich dark color of these patches and the whitish or whitish-gray color on rest of upper surface which brings them out in sharp relief.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

ON SOME BIRDS FROM PUEBLO VIEJO, COLOMBIA.

BY OUTRAM BANGS.

Mr. W. W. Brown, Jr., has just sent to the Bangs collection the results of about two weeks' collecting at the village of Pueblo Viejo, in the high Sierra Nevada de Santa Marta, Colombia. The number of birds obtained was rather small, as his time was principally occupied in collecting mammals, which were found in much greater numbers than at the lower altitudes previously worked. All the birds here recorded, with the exception of one *Hemiprocne zonaris*, were taken at Pueblo Viejo, at about 8000 feet altitude, in the latter part of March, 1898.

I am deeply indebted to Dr. Chas. W. Richmond, of the United States National Museum, for his great kindness in looking over the birds and comparing them with skins in the National Museum collection. Indeed, without his valuable assistance I should have been unable to identify many of the species.

(NOTE.—All measurements are in millimeters.)

Porzana albigularis (Lawr.).

One adult, unsexed, taken Mar. 28, 1898.

Geotrygon linearis (Prév. & Knip).

One adult male, Mar. 28, 1898.

Syrnium virgatum Cassin.

One female, just emerging from immature plumage, Mar. 21, 1898.

Ramphastos brevicarinatus Gould.

One specimen.

Aulacorhamphus calorhynchus Gould.

Four males. All have larger bills than the one female I recorded in my last paper * from Santa Marta, the type locality of the species. The difference is doubtless sexual.

Anthocephala floriceps (Gould).

One fine adult male, taken Mar. 20, 1898, is, so far as I know, the only specimen of this extremely rare hummer in this country.

Hemiprocne zonaris (Shaw).

One adult male, taken at Santa Marta, Colombia, Feb. 18, 1898. Not quite typical. Wing, 193; tail, 72; length (skin), 198; about the size of *H. zonaris albicincta* (Cab.), but the white collar is wider instead of narrower on the upper side.

Mionectes olivaceus Lawr.

Two males, taken Mar. 20, 1898.

Elænia browni sp. nov.

Type (and only specimen), from Pueblo Viejo, Colombia. No. 5573, ♂ adult, coll. of E. A. and O. Bangs. Collected Mar. 23, 1898, by W. W. Brown, Jr. Altitude 8000 ft.

Specific characters.—Nearest *E. mesoleuca* Cab. & Heine, of Brazil, but smaller; olive green of upper parts browner (darker); axillaries, under wing-coverts, sides of body, and under tail-coverts less yellow; throat pale yellowish green, instead of grayish white.

Size.—♂ adult: wing, 72.2; tail, 64.4; exposed culmen, 10.

Myiodynastes chrysocephalus (Tschudi).

One female, March 21, 1898.

Myiobius nævius (Bodd.).

One male, Mar. 21, 1898. The crest is red.

Myiarchus nigriceps Scl.

Two specimens, male and female.

Tityra semifasciata (Spix).

Two specimens, male and female.

Automolus rufipectus sp. nov.

Type (and only specimen), from Pueblo Viejo, Colombia. No. 5580, ♂ adult, coll. of E. A. and O. Bangs. Collected Mar. 21, 1898, by W. W. Brown, Jr. Altitude 8000 feet.

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* Proc. Biol. Soc. Wash., XII, p. 134, June 3, 1898.

Specific characters.—Back and top of head dark olive-brown; forehead and auriculars chestnut-rufous; wings rufous, darker on outer webs, brighter on inner; ends of primaries dusky; upper and under tail-coverts and tail chestnut-rufous; throat buff; chest rufous, this color forming a conspicuous band and extending along neck to auriculars; center of belly tawny-olive shading to raw umber on sides and flanks.

Size.—♂ adult: wing, 83.2; tail, 77; exposed culmen, 23.

Remarks.—*A. rufipectus* is apparently very different from any of the described species, its rufous chest being distinctive.

Conopophaga sp.?

One female, which cannot be properly identified at present. It has no white tufts on sides of head.

Cassidix oryzivora (Gmelin).

Two males.

Buarremon basilicus sp. nov.

Type (and only specimen), from Pueblo Viejo, Colombia. No. 5598, ♂ adult, coll. of E. A. and O. Bangs. Collected Mar. 21, 1898, by W. W. Brown, Jr. Altitude 8000 ft.

Specific characters.—Nearly related to *B. torquatus* (d'Orb. & Lafr.) from Bolivia, but differing from that species in gray instead of white superciliary stripe; in reddish olive instead of olive green back, rump, wing-coverts, edges of tail, wing feathers, tail-coverts and sides of body; in pale fawn-color instead of white breast and center of belly; in wider black band across chest; and in larger bill.

Size.—♂ adult: wing, 81.2; tail, 78.8; exposed culmen, 17.4.

Remarks.—This new species is probably nearly related to *B. poliophrys* (Berl. and Stolz.), which has the same slate-gray superciliary stripe. *B. poliophrys* is said to be otherwise like *B. torquatus*, while the Pueblo Viejo bird has a larger bill and many differences in color.

Sporophila sp.?

One female. The species cannot be determined by this skin, which is not in distinctive plumage.

Calospiza desmaresti (Gray).

Two males.

Calospiza cyanoptera (Swains.).

Two males of the bird which I recorded in my last paper* as '*Calospiza* sp.?' on the basis of a female specimen.

Ramphocelus dimidiatus Lafr.

Eight specimens, including males and females.

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* Proc. Biol. Soc. Wash., XII, p. 141, June 3, 1898.

Tachyphonus rufus (Bodd.).

Four specimens, a male and three females.

Helminthophila chrysoptera (Linn.).

One adult female, Mar. 20, 1898, winter resident.

Basileuterus cinereicollis Scl.

One male.

Thryothorus laetus sp. nov.

Type (and only specimen), from Pueblo Viejo, Colombia. No. 5601, ♂, coll. of E. A. and O. Bangs. Collected Mar. 19, 1898, by W. W. Brown, Jr. Altitude 8000 ft.

Specific characters.—Resembling in general style of coloration *T. rutilus* Vieillot, but feathers of russet chest and white breast and upper abdomen marked with black subterminally, giving a mottled appearance to the under parts.

Size.—♂, wing, 59.6; tail, 49.4; exposed culmen, 17.

Remarks.—At first glance the type and only specimen of *T. laetus* gives one the impression of a spotted young, but a closer examination shows that this is not so. The feet and bill are those of an adult and the plumage shows no signs of immaturity.

Henicorhina leucophrys (Tschudi).

One adult male.

Catharus aurantiirostris (Hartl.).

One adult male.

Merula phæopyga (Cabanis).

Two males. These are not exactly the same as a specimen from British Guiana (presumably taken near the type locality) in the National Museum collection. Neither can they be referred to *M. phæopyga spodiolæma* (Berl. and Stolz.) of central Peru, or to *M. phæopyga saturata* (Berl.) of Bogota. It is very likely that they represent still another subspecies of this wide-ranging and variable thrush.

VOL. XII, PP. 161-165 AUGUST 10, 1898

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

DESCRIPTIONS OF SOME NEW MAMMALS FROM THE SIERRA NEVADA DE SANTA MARTA, COLOMBIA.

BY OUTRAM BANGS.

In the fine material already sent to the Bangs collection by W. W. Brown, Jr., from the Santa Marta region of Colombia are apparently five new mammals. The collections contain many other species, including wide-ranging tropical-forest forms, and other species the exact identity of which I have not yet determined. The present paper contains merely preliminary descriptions of some of the new forms, but I hope to be able later on to give a full account of all the mammals Mr. Brown secures in this region.

Mr. Oldfield Thomas has kindly compared some of the small rodents with the types in the British Museum from Bogota, Colombia, and Merida, Venezuela. He finds that the Santa Marta animals have closer affinity with those from Merida than with those from Bogota.

Philander cicur sp. nov.

Type from Pueblo Viejo, Colombia, altitude 8000 ft. No. 8114, ♀ adult, coll. of E. A. and O. Bangs. Collected March 27, 1898, by W. W. Brown, Jr.

General characters.—Size large; tail longer than head and body, hairy above for about half of its length, below for about one-fourth its length; no gray stripe on back; upper surface of arms deep hazel.

Color and *Pelage.*—Fur long, dense and soft; hairs of upper parts rich brown, between hazel and russet, at tips, mouse gray at base, the gray color showing through in places, especially about shoulders and along lower sides; no gray mark or stripe on back; face dark gray; a narrow dark brown stripe from nose to between ears, where it merges into brown of occiput; a dark brown circle around eye; base of whiskers dusky; whiskers black; under parts yellowish white, purest on belly and along median line, grayer on sides and under surface of neck; arms bright hazel above, yellowish white below; legs hazel near feet, gray near body;

feet and hands pale brown, in dried skin ; ears hairy at base outside, naked inside and for rather more than half their length outside ; a gray mark across base of ear, rest of hairs brown ; tail naked above for about half its length, below for about three-fourths its length ; hairy portion of tail brown, like back, but the hairs unicolor throughout their entire length ; naked portion, in dried skin, yellow, with some irregular black spots, all near where the hair ends ; " testicles glaucous blue." *

Measurements.

No.	Locality.	Sex.	Total length.	Tail vert.	Hind foot.	Ear from notch.
8114	Pueblo Viejo, Colombia...	♀ ad.	580	335	36	33
8115	" " " ...	♂ ad.	580	325	37	30
8116	" " " ...	♂ yg. ad.	510	280	35	31
8036	Near Santa Marta, Colombia, 4000 ft.	♂ ad.	610	370	40	32

Skull, type, ♀ adult : basal length, 49 ; zygomatic width, 30.8 ; mastoid width, 20.2 ; interorbital width, 9.8 ; width across postorbital processes, 15 ; length of nasals, 21.6 ; greatest length of single half of mandible, 39.2.

Remarks.—This handsome *Philander* is represented by four examples, three taken at Pueblo Viejo at an elevation of 8000 ft. and one taken on top of a small mountain near Santa Marta at 4000 ft. The Santa Marta skin has a much longer tail and larger hind foot than any of the others, but otherwise they are all four very similar. *P. cicur* is apparently nearest to *P. derbianus*, but differs from that species in having rich brown instead of white upper sides to arms and in lacking the gray dorsal stripe. Another species that may be somewhat closely related is the *P. ornatus* Tschudi of Peru, but this also has the gray dorsal stripe, which is wholly absent in *P. cicur*.

Marmosa mitis sp. nov.

Type from Pueblo Viejo, Colombia, 8000 ft. No. 8123, ♂ adult, coll. of E. A. and O. Bangs. Collected Mar. 25, 1898, by W. W. Brown, Jr.

General characters.—Nearest to *M. murina*, but slightly smaller ; color above less ferruginous, and much paler, especially on middle of face ; skull slightly different.

Color and *Pelage.*—Pelage short, dense, soft ; upper parts varying from dull tawny-olive to pale bistre, darkest along dorsal line and shading on sides of neck and lower sides to cinnamon-buff ; under fur slaty ; middle of face between black eye-spots much paler—wood brown ; under parts, chin, neck, inside of arms, chest and belly yellowish white, in some specimens somewhat suffused with buffy, the hairs one color to their base ; lower sides more strongly buffy, the hairs slate color at base ; feet and hands dull white; tail indistinctly bicolor, brownish dusky above, grayer below, clothed with very short appressed hairs.

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* Note made by Mr. Brown from fresh specimens.

Cranial characters.—The skull as compared with that of *M. murina* differs in greater postorbital constriction and higher, heavier rostrum. The nasals are broad and heavy, slightly arched, and the maxillaries somewhat swollen laterally.

Measurements.—The type, ♂ adult: total length, 325; tail vertebræ, 175; hind foot, 22; ear from notch, 24. An old adult ♀ topotype, No. 8139, total length, 325; tail vertebræ, 185; hind foot, 21; ear from notch, 24. Average of ten adults, ♂ and ♀, topotypes, total length, 321.7; tail vertebræ, 176; hind foot, 21.6; ear from notch, 24.3.

Skull, the type, ♂ adult: basal length, 36.2; occipitonasal length, 39.4; zygomatic width, 20.6; mastoid width, 14; width between orbits, 6.2; length of nasals, 18.6; width of nasals, 5.2; greatest length of single half of mandible, 29.

Remarks.—Mr. Brown took twenty-seven examples of *M. mitis* at Pueblo Viejo at 8000 feet altitude, but did not secure any at lower elevations. *M. mitis* is probably nearest to *M. murina*, but differs in slightly smaller size, in color, and in cranial characters. *M. fuscata* Thomas, of Merida, Venezuela, is perhaps also somewhat closely related. It differs in having the hairs of the under parts slaty at base and in its smaller size and different cranial proportions.

Dasyprocta colombiana sp. nov.

Type from Santa Marta, Colombia. No. 8008, ♀ young adult, coll. of E. A. and O. Bangs. Collected Jan. 6, 1898, by W. W. Brown, Jr.

General characters.—Size medium; general color dark; hairs on back of head and neck slightly elongated, but not forming decided crest; hairs of rump black with white tips.

Color and *Pelage.*—Hairs stiff and coarse; back, shoulders, and head, black, each hair with an ochraceous band near tip, this band shorter on hairs of center of back and longer on those of sides; elongate hairs of rump black with white tips; under parts, center of belly, median line, and throat whitish; under side of neck and lower sides, hairs annulated like those of back, but the yellow bands rather paler; legs and arms, feet and hands black, slightly lined with yellow; ears sparsely haired, rather more hairy at base than at tip, the hairs ochraceous.

Measurements.

No.	Locality.	Sex.	Total length.	Tail vert.	Hind foot.	Ear from notch.
8008	Colombia, Santa Marta ..	♀ yg. ad.	500	25	126	40
8113	Colombia, Pueblo Viejo...	♂ yg.	470	30	115	36

Skull, the type, ♀ young adult: basal length, 189.4; zygomatic width, 49.4; mastoid width, 36; width between orbits, 28.6; width across postorbital processes, 38.6; length of nasals, 42.4; greatest length of single half of mandible, 58.2.

Remarks.—Mr. Brown has thus far sent two specimens of this agouti, one, the type, a female, taken at Santa Marta, probably full grown, though not quite adult, has the last molar on both upper and under jaw just coming into place. The other is a younger male taken at Pueblo Viejo at 8000 feet. Both agree perfectly in coloration.

D. colombiana appears, so far as I can judge by descriptions, to be very different in color from any of the neighboring species, the peculiar coloring of the rump being distinctive. Unfortunately, through lack of material, I can say nothing of its cranial characters at present.

Oryzomys flavicans illectus subsp. nov.

Type from Pueblo Viejo, Colombia, altitude 8000 ft. No. 8101, ♂ adult, coll. of E. A. and O. Bangs. Collected March 24, 1898, by W. W. Brown, Jr.

General characters.—Similar in size, proportions and cranial characters to *O. flavicans* Thomas, of Merida, Venezuela; differs in color of under parts, which are a beautiful rich orange-buff to base of hairs—the under parts of true *flavicans* being whitish.

Color.—Upper parts, bright yellowish brown, about tawny-ochraceous, a scattering of dark brown hairs along back and on top of head; lower sides and under parts orange-buff; usually a small white spot on throat; hairs of upper parts and sides slate gray at base, those of belly, chest and throat unicolor for their whole length; feet and hands buff.

Measurements.—The type, ♂ adult: total length, 292; tail vertebræ, 160; hind foot, 25; ear from notch, 17. Average of five adult topotypes, ♂s and ♀s: total length, 279.4; tail vertebræ, 146.8; hind foot, 26; ear from notch, 17.2.

Tayassu torvus sp. nov.

Type from Santa Marta, Colombia. No. 8038, ♂ adult, coll. of E. A. and O. Bangs. Collected Jan. 26, 1898, by W. W. Brown, Jr.

General characters.—Size smaller than either *T. tajacu* of southern Brazil or *T. angulatus* of Texas. Color and external characters as in those two species. Skull smaller and otherwise different.

Cranial and *dental characters.*—Skull low, short and wide; nasals short, taken together, evenly rounded and rather flat; malar crest continued forward to canine alveolus. Molar teeth not wrinkled; molars and premolars all very large; two small upper premolars molariform, quadrate and quadritubercular; the small anterior lower premolar with the forward large tubercule divided into two, like next premolar. In *T. tajacu* this tooth has the forward large tubercule plain and single, differing in this from the next premolar.

The skull of *T. torvus* can be distinguished from that of *T. tajacu* in the extension of the malar crest forward to canine alveolus; in much larger molars and premolars; in the two smaller upper premolars being distinctly quadritubercular and quadrate; in the form of the small anterior lower premolar. From *T. angulatus* it can be distinguished by nasals not being angulated in the middle line and molars not being wrinkled. From both *T. angulatus* and *T. tajacu* it differs by being shorter, lower, and wider, and by the larger molar and premolar teeth.

Measurements.—The type, ♂ adult: head and body, 1075; hind foot, 170; ear from notch, 75.

Skull: basal length, 186; zygomatic width, 95.4; width between orbits, 50; width across postorbital processes, 71.4; width of palate at forward alveoli of last molars, 23; greatest length of single half mandible, 156; length of molar series (molars and premolars, alveoli)—upper, 67.8; under, 74.

Remarks.—Mr. Brown has thus far sent but one specimen, the type, a fine old male skin and skull. This specimen is, however, so different from either *T. tajacu* of southern Brazil or *T. angulatus* of Texas that I feel justified in separating it. Whether it is a species or only a race of *T. tajacu* can, of course, not be told without much more material than is now available.

When Prof. Cope named the Texan peccary *angulatus* * he irrevocably restricted the Linnæan name *tajacu* to the peccary of southern Brazil.

Through the kindness of Mr. Witmer Stone, I have been able to compare my Santa Marta skull with two of Prof. Cope's original southern Brazil skulls that had come into the collection of the Academy of Natural Sciences.

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* Am. Nat., Feb., 1889, pp. 146–147.

VOL. XII, PP. 167-168 AUGUST 10, 1898

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

A NEW RACE OF THE LITTLE HARVEST MOUSE FROM WEST VIRGINIA.

BY OUTRAM BANGS.

Within the last year Mr. Thaddeus Surber has found that the Little Harvest Mouse is comparatively common in the country about White Sulphur Springs, W. Va. He has sent me five specimens and has taken several more that are in his own private collection. The one specimen taken at Fort Myer, Va., by L. Z. Mearns* is the only other record I know for this mouse from so far north in the eastern United States On comparing these West Virginia specimens with true *Reithrodontomys lecontii* from Georgia and northern Florida some differences in color, proportions, and cranium can be seen, and I propose to separate the northern form as follows:

Reithrodontomys lecontii impiger subsp. nov.

Type from White Sulphur Springs, W. Va. No. 7784, ♂ old adult (with much worn teeth), coll. of E. A. and O. Bangs. Collected Feb. 27, 1898, by Thaddeus Surber. Original No. 466.

General characters.—Size a little smaller than true *R. lecontii;* tail slightly shorter; ear much smaller; pelage longer and softer; colors of back richer brown, sides paler, the contrast in color between sides and back more marked; skull smaller, more slender and lighter throughout; molar teeth rather larger.

Color.—Adult in winter pelage, upper parts dark russet brown, rather darker along middle of back and on rump, sides much paler, almost ochraceous buff on lower sides; under parts grayish white, irregularly washed, in some specimens, with fawn color; feet and hands grayish white; ears dusky, with some reddish brown hairs on both inner and outer surfaces; tail indistinctly bicolor, dusky above, grayish white below, rather more hairy than in true *R. lecontii;* under fur plumbeous throughout except on chin and under side of head, where the hairs are whitish to their base.

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* Recorded in Am. Nat., XXXI, p. 161, Feb., 1897.

Measurements.

No.	Sex.	Total length.	Tail vert.	Hind foot.	Ear from notch (dried skin).
7784	Type, ♂ adult.........................	112	51	15	9
6932	Topotype, ♂ adult....................	115	51	15	9
7785	" ♀ adult..................	120	53	15	8.5

Remarks.—Specimens from Raleigh, N. C., of which there are many in collections, taken by the Brimley brothers, appear to be intermediates, though nearer true *R. lecontii.* In *R. lecontii impiger* the ear is much smaller than in all specimens I have examined from Georgia and northern Florida. For instance, an adult ♀ *R. lecontii lecontii* taken by W. W. Brown, Jr., at Pinetucky, Ga., measures: Total length, 136; tail vertebræ, 62; hind foot, 16; ear from notch, 12 (in dried skin 11.5). Judged by the skulls, this specimen is younger than the type of *R. lecontii impiger*. These differences in size and proportions, combined with the differences in color and the smaller and more delicate skull of *impiger*, serve to distinguish all specimens I have examined from extreme localities.

VOL. XII, PP. 169-170 AUGUST 10, 1898

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

DESCRIPTION OF A NEW WEASEL FROM THE QUEEN CHARLOTTE ISLANDS, B. C.

BY EDWARD A. PREBLE.

Last spring I received through the kindness of Rev. J. H. Keen, of Massett, Queen Charlotte Islands, a fine adult weasel in alcohol. As it had not been long immersed, I skinned it at once in order to preserve its color, and presented the specimen to the Biological Survey Collection in the U. S. National Museum. The skin is in late winter pelage, the dark fur of the summer coat just beginning to appear on the head and back.

I was not surprised, considering the isolated habitat, to find that this weasel belonged to an undescribed species, which may be characterized as follows:

Putorius haidarum * sp. nov.

Type from Massett, Queen Charlotte Islands, B. C. Skin and skull No. 94430, U. S. Nat. Mus., Biological Survey Coll. Collected March 17, 1898, by Rev. J. H. Keen.

Geographical distribution.—Known only from the type locality.

General characters.—Similar in general characters to *Putorius kadiacensis* from Kadiak Island, Alaska, but differing in smaller size, in the increased amount of black on tail, and in cranial characters; also apparently differing greatly in color of the summer pelage.

Color of type.—White, slightly tinged posteriorly and beneath with saffron yellow. Terminal portion of tail, comprising about 60 per cent. of the entire length, black. Small spots of summer fur just appearing on face, top of head, and back, blackish-brown.

Cranial characters.—The skull is about the size of *Putorius cicognani*, but requires no comparison with that species, being much more stoutly built and angular. Compared with *Putorius kadiacensis*, which is undoubtedly its nearest relative, the skull of the present species is considerably smaller, with flatter braincase, mandible more deflected, post-palatal notch much smaller, relatively and absolutely. Zygomata very slender throughout, post-molar production of palate longer and narrower, and post-glenoid space longer and more swollen. Bullæ smaller and flatter. Teeth throughout much smaller than in *P. kadiacensis*.

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* Dedicated to the Haidas, the resident tribe of Indians.

Remarks.—By a fortunate coincidence the type of the present species and the type of *P. kadiacensis*, with which it requires comparison, agree exactly in condition of pelage. Both are also adult males of almost precisely the same age, a circumstance which makes the comparison simple and satisfactory. The fur of *P. haidarum* is finer than that of *P. kadiacensis*. In the latter species the summer fur just appearing is light-brownish in color, thus contrasting quite strongly with the blackish brown of the corresponding portions of *P. haidarum*. The terminal portion of the tail of *P. kadiacensis* is considerably suffused with brownish, while in *P. haidarum* it is pure black. The type of *P. kadiacensis* measured in the flesh: Total length, 318; tail vertebræ, 86; hind foot, 44; pencil of tail, 40. *P. haidarum* measured in flesh: Total length, 275; tail vertebræ, 60; hind foot, 37; pencil of tail, 40. The black portion of the tail measured about 60 mm. in each case, thus comprising about 60 per cent. of the entire length of the tail in *P. haidarum* and about 50 per cent. in *P. kadiacensis*.

The type skull of *P. haidarum* measured as follows: Basal length, 38; zygomatic breadth, 22.5; mastoid breadth, 19; breadth across post-orbital processes, 13; interorbital breadth, 10.5; foramen magnum to posterior plane of molars, 25; palatal length, 15.5; post-palatal length, 20.5.

Unfortunately this skull was infested with parasites, and therefore the measurement of the breadth across post-orbital processes may not be exactly correct.

VOL. XII, PP. 171-182 OCTOBER 31, 1898

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

ON SOME BIRDS FROM THE SIERRA NEVADA DE SANTA MARTA, COLOMBIA.

BY OUTRAM BANGS.

Mr. W. W. Brown, Jr., has recently sent a third lot of birds, including about three hundred skins, to the Bangs collection. These specimens were collected during May and June, 1898, at the following localities in the Sierra Nevada de Santa Marta, Colombia: Palomina, altitude 5000 feet; San Francisco, 6000 feet; San Miguel, 7500 feet; and Macotama, 8000 feet. Many of the birds are in worn breeding plumage, and some of the species are also represented by young in first plumage. Again I am in debted to Mr. R. Ridgway and Dr. C. W. Richmond for aid in determining many species.

(NOTE.—All measurements are in millimeters. Colors, when definite names are used, are according to Ridgway's Nomenclature of Colors.)

Neocrex colombianus sp. nov.

Type (and only specimen), from Palomina, Colombia, No. 5700, ♀ adult, coll. of E. A. and O. Bangs. Collected May 22, 1898, by W. W. Brown, Jr. Altitude, 5000 feet.

Specific characters.—This species resembles in a general way the only other member of the genus—*N. erythrops* Scl. of Lima, Peru, but differs much in details of coloration and markings—lower abdomen white instead of dusky brown; lower flanks and under tail-coverts, *unbarred*, pale, cinnamon instead of blackish; under wing-coverts white, some of the feathers faintly streaked with dusky, instead of " dusky brown narrowly barred with white."

Color.—Adult ♀, back, rump, upper tail-coverts and wings (except primaries) bistre; primaries hair brown, narrowly edged with bistre; tail bistre, the center and base of the feathers shading towards hair brown;

pileum brownish slate, some of the feathers tipped with dark bistre; throat white; sides of head, sides of neck, jugulum, breast and abdomen slate gray; center of belly pure white; flanks and under tail-coverts pale cinnamon, without a trace of any barring whatever; bend of wing and under wing-coverts white, a few of the feathers slightly streaked or spotted with very pale and indistinct markings of hair brown; axillars pale bistre; 'tarsus red; base of bill red, tip green.' *

Size.—♀ adult: Length, skin, 148; † wing, 93.2; tail, 29; exposed culmen (approximately, a shot having broken base of upper mandible), 18.8; tarsus, 30.

Remarks.—I have had no specimens of *N. erythrops* for comparison; but Sclater's original diagnosis, as well as Sharpe's description of an adult female, in the British Museum,‡ indicate a bird so different from mine as to leave no doubt of the specific distinctness of the two.

Porzana albigularis (Lawr.).

Two adult males from Palomina, May.

Columba albilinea Bp.

One adult female from Palomina.

Falco sparverius Linn.

Two adults, male from Palomina, June 22; female from San Miguel, June 14.

Conurus wagleri Gray.

Seventeen adults, males and females, from Palomina and San Miguel.

Pionus sordidus (Linn.).

One adult male from San Miguel, June 17, 1898.

Crotophaga ani Linn.

One female from Palomina.

Aulacorhamphus calorhynchus Gould.

Two adult males from Palomina. In my two former papers on the birds collected by Mr. Brown I wrongly gave the type locality of this species as Santa Marta. It is really Merida, Venezuela.

Mr. Brown has now sent seven specimens. This series shows great variation in the length of the bill, which certainly does not depend upon sex, but seems to be individual.

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* Note made by Mr. Brown from the fresh specimen.

† Mr. Brown's skins are rather smaller than those of most collectors, but as this measurement is only approximate in any case, I give it for what it is worth.

‡ Cat. Birds Brit. Mus., XXIII, 1894, 163.

I have some doubt whether the bird from the Sierra Nevada de Santa Marta is subspecifically the same as that of the Andes of Venezuela, but without material from the type locality I cannot be sure. All my specimens have a large black mark at the base of the culmen; the end of the tail is strongly bluish; and there is a wash of dark olive yellow on the sides of the head.

Aulacorhamphus lautus[*] sp. nov.

Type (and only specimen), from San Miguel, Colombia. No. 5789, ♂ adult, coll. of E. A. and O. Bangs. Collected June 6, 1898, by W. W. Brown, Jr. Altitude, 7500 ft.

Specific characters.—Not much like any described species. Among the species having chestnut tips on rectrices it agrees in color of throat only with *A. albivittatus*, but is a much smaller bird, lacks the chestnut basal portion of mandible, and has the basal portion of culmen black, besides differing in several minor particulars. In pattern of bill the new species agrees best with *A. cæruleogularis* of Costa Rica and Veragua, but differs in the absence of the chestnut spot at base of yellow maxillary stripe, and in having a gray instead of deep blue throat.

Color.—Upper parts grass green—more bluish on wings, more yellowish on back; primaries and inner webs of secondaries dusky, with narrow yellow border on inner edges; a small blue supraorbital stripe; throat cinereous; breast and abdomen pale grass green to apple green; feathers of center of belly white at base; crissum chestnut; tail, above, green, bluish towards end, each feather tipped with chestnut; below, black, each feather tipped with chestnut; bend of wing and under wing-coverts pale yellow. Bill, maxilla, tip and stripe along culmen which divides at base of culmen and encloses a large black patch, yellow; sides and patch at base of culmen black; mandible black; a broad yellowish white stripe across base of maxilla and mandible.

Size.—Length (skin), 291; wing, 124; tail, 108.8; exposed culmen, 69.6; tarsus, 34.

Phœthornis longirostris (Less. and De Latt.).

Four adults, three males and one female, from Palomina.

Petasophora iolata Gould.

Twenty-eight adults, males and females, from Macotama and San Miguel—May and June.

Leucuria gen. nov. (**Trochilidæ**).

Type.—Leucuria phalerata, sp. nov.

Characters.—Related to *Helianthea* and also to *Hemistephania.* Bill long, straight, cylindrical (slightly shorter and broader than in *Helianthea*); wings reaching about to end of tail; tarsus naked with the exception of a bunch of white feathers near heel; tail long, broad, forked, pure white; upper and under tail-coverts white; whole crown, forehead, and lores metallic.

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[*] Lautus = neat, elegant, in a fine dress.

(For size, colors, and arrangement of colors, see description of type species below.)

Leucuria phalerata sp. nov.

Type (and only specimen) from Macotama, Colombia. No. 5731, ♂ adult, coll. of E. A. & O. Bangs. Collected June 17, 1898, by W. W. Brown, Jr. Altitude, 8000 ft.

Color.—Forehead, crown and lores very brilliant metallic blue, with, in some lights, green reflections; auriculars, back and wing-coverts dark grass green, in some lights quite dusky on cervix and upper back; chin dark grass green with slight metallic reflections; throat metallic violet; breast metallic sea green; abdomen shining grass green; wings purplish-brown; feathers of tarsi, upper and under tail-coverts and tail, including shafts of feathers, pure white.

Size.—♂ adult: Length (skin), 120; wing, 72.2; tail—longest rectrix, 47, shortest rectrix, 35.6; culmen, 26.8; greatest width of outer rectrix, 9.8.

Remarks.—Of this fine hummer Mr. Brown has taken but one adult male—the only one seen in months of collecting. This adds another striking local species of humming bird to the five already described from the Sierra Nevada de Santa Marta.

Thalurania columbica (Bourc.).

Two adults, male and female, from San Miguel and Palomina.

Metallura smaragdinicollis (D'Orb. and Lafr.).

Two adults; male from Palomina, May 10, female from San Miguel, June 12, 1898.

Panychlora russata Salv. and Godm.

Six adults, five males and a female, from San Miguel and Palomina, May and June.

Myiotheretes striaticollis Scl.

One adult male from Macotama, June 17, 1898.

Ochthoeca poliogaster Salv. and Godm.

One adult female from Macotama, June 17, 1898.

Sayornis cineracea (Lafr.).

One young in first plumage from San Miguel, June 4, 1898.

Tyranniscus chrysops (Scl.).

Two males, one adult, the other young, from Palomina.

Elænia browni Bangs.

Five adults from San Miguel, June.

Elænia sororia sp. nov.

Eleven adults, males and females, ten from Palomina, May, and one from San Miguel, June 16, 1898.

Type from Palomina, Colombia, No. 5826, ♀ adult, coll. of E. A. and O. Bangs. Collected May 10, 1898, by W. W. Brown, Jr. Altitude, 5000 ft.

Specific characters.—Similar to *E. browni*, but darker and not so greenish above; cap considerably darker than the back (nearly uniform in *E. browni*); concealed white at base of crown pronounced (nearly obsolete in *E. browni*); inner web of innermost tertiary only edged with white (wholly white in *E. browni*); patch of greenish-yellow edging on outer webs of secondaries not so bright and pronounced as in *E. browni;* lining of wing strongly tinged with buff—clear yellow in *E. browni;* bill more robust and not so compressed near the tip.

Color.—Adult in somewhat worn plumage; upper parts dull olive brown (almost hair brown); cap darker than back; large concealed white patch on center of crown; wing bars, edgings of primaries, secondaries, and tertials yellowish or greenish white; lining of wing buffy; throat dull gray; breast, sides and flanks brownish gray; abdomen and under tail-coverts pale yellow to yellowish white.

Size.—♂ adult, Topotype, No. 5827: Length, skin, 134; wing, 77; tail, 66; exposed culmen, 10.8; tarsus, 17.4. ♀ adult, Type—Length, skin, 128; wing, 73; tail, 63.2; exposed culmen, 10.6; tarsus, 17.

Remarks.—*E. browni* and *E. sororia* are closely related, though entirely distinct species. From the material Mr. Brown has so far collected, I should judge that *E. sororia* is found at rather lower elevations than *E. browni*, though their ranges meet. At Palomina Mr. Brown found only *E. sororia.* At San Miguel he took five examples of *E. browni* and one of *E. sororia.* The molting season of the two species appears to be different, as the specimens of *E. browni* shot at different dates in June at San Miguel are all in fresh plumage, while all the examples of *E. sororia* taken at Palomina in May and the one killed at San Miguel, June 16, are in somewhat worn plumage. The great difference in color between the two series may be in part seasonal; but *E. sororia* is probably never very greenish on the upper surface.

Both *Elænia browni* and *E. sororia* seem to belong in that section of the genus called *Myiopagis* by Salvin and Godman:* a group I should be unwilling to allow even subgeneric rank.

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* Biol. Cent.-Am., Aves, II, 1888, 26 (Type *Elainea placens* Scl.).

Myiozetetes texensis colombianus (Cab. and Heine).

One adult female from Palomina.

Rhynchocyclus sulphurescens (Spix).

Three adults, two males and one female, from Palomina.

Myiodynastes audax nobilis (Scl.).

One adult male from Palomina.

Myiodynastes chrysocephalus (Tschudi).

One adult female from San Francisco.

Megarhynchus pitangua (Linn.).

One adult male from Palomina.

Myiobius vieillotioides (Lafr.).

One adult male from San Francisco, June 1, 1898.

Myiobius nævius (Bodd.).

One adult female from Palomina. The crest is yellow slightly tinged with orange.

Myiarchus nigriceps Scl.

Ten specimens from Palomina and San Miguel. Nine are adults in rather worn plumage and one is a young bird in first plumage.

Tyrannus melancholicus satrapa (Licht.).

Ten adults, including both sexes. Eight are from Palomina and two from Macotama. The Macotama birds have larger bills than those from Palomina but otherwise do not seem to differ.

Milvulus tyrannus (Linn.).

Five specimens from Palomina, four adults and one young in first plumage.

Formicivora caudata Scl.

Two specimens, one a male and the other probably a female, from Palomina, taken in May and June.

It is very probable that these are not true *F. caudata* Scl., which is said to have black rectrices tipped with white. The Palomina birds have brown tails, with a subapical black band and white tips; they may not, however, be fully adult.

Synallaxis albescens Temm.

Five adults, males and females, from Palomina, May.

Synallaxis fuscorufa Scl.

Three adults, two males and one female, from San Miguel, May and June. These appear to be *S. fuscorufa*, the type locality of which is San Sebastian, Colombia, though they do not agree well with Sclater's description, in which the back is said to be brown. The San Miguel specimens are in somewhat worn plumage, with the back rather gray than brown—a grayish hair brown—the breast ferruginous rather than cinnamon, and little paler than the cap.

Xiphocolaptes procerus Cab.

One adult female from Macotama June 24. Judged by descriptions, this specimen is *X. procerus.* Mr. Ridgway has examined the skin and is of also this opinion.

Sclerurus albigularis Swains. (subsp. nov. ?).

One adult female from Palomina, May 18.

This skin Mr. Ridgway has compared with a specimen of *S. albigularis* from Tobago, and with the type of *S. canigularis* from Costa Rica, and finds that it is exactly intermediate. If more specimens from the same region should prove the characters of this intermediate race to be constant it might be well to give it a subspecific name.

Grallaria spatiator sp. nov.

Type (and only specimen) from Macotama, Colombia. No. 5683, ♂ adult, coll. of E. A. and O. Bangs. Collected June 17, 1898, by W. W. Brown, Jr. Altitude, 8000 ft.

Specific characters.—Resembling *G. rufula*, but with much shorter bill; longer and more slender tarsus; and darker, duller brown coloration.

Color.—Upper parts, about mummy brown, many of the feathers shaded by a more reddish olive tinge; primaries dusky edged with russet; tail mummy brown; chin whitish; throat and breast cinnamon-russet; flanks raw umber; lower abdomen and crissum soiled white, the feathers somewhat marbled with raw umber and russet.

Size.—♂ adult: Length, skin, 132; wing, 83.6; tail, 42; exposed culmen, 20; tarsus, 46.

Ostinops decumanus (Pall.).

Two adults, male and female, from Palomina.

Cassidix oryzivora (Gmel.).

Four specimens, adult males, and female, and young male, from Palomina.

Spinus spinescens capitaneus subsp. nov.

Three adult males from San Miguel.

Type.—From San Miguel, Colombia. No. 5674, ♂ adult, coll. of E. A. and O. Bangs. Collected June 14, 1898, by W. W. Brown, Jr. Altitude, 7500 ft.

Subspecific characters.—Like true *S. spinescens* but much larger; bill very much larger.

Color.—Adult ♂: Forehead and crown black; occiput, cervix, back and upper tail-coverts dark oil green, slightly touched with indistinct dusky markings; lower rump bright olive green; wings black, crossed by a broad yellow band, middle and greater coverts tipped with oil green; secondaries edged with green, tipped with whitish; primaries narrowly edged with green and just tipped with whitish; under parts between oil green and olive yellow, more green on throat, upper breast, sides and flanks, more yellow on lower breast, upper abdomen and under tail-coverts; center of belly white; tail black, yellow at base.

Size.—Adult ♂: Length, skin, 106; wing, 70.8; tail, 46.2; exposed culmen, 11; depth of bill at base, 7.6; tarsus, 14.2.

Remarks.—The three skins agree very closely among themselves and differ from true *S. spinescens* in being much larger, especially the bill.

Brachyspiza capensis peruviana (Lesson).

Four adult males, from San Miguel.

Buarremon melanocephalus Salv. and Godm.

Twenty specimens, males, females, and young in first plumage, from San Miguel, Palomina, and San Francisco.

The young are similar to the adults but the colors are all duller, the back is more olivaceous, and the under parts duller yellow, somewhat marked on the sides and chest with dusky spots.

Saltator magnus (Gmel.).

Four adults, males and females, from San Miguel and Palomina. I still doubt whether this bird is true *S. magnus*, but having no specimens from Cayenne for comparison, must let it pass as such.

Arremon schlegeli Bp.

Four adults, males and females, from Palomina and San Miguel.

Emberizoides macrurus (Gmel.).

Three specimens, an adult male from San Miguel, an adult female from Macotama, and a female in first plumage from Palomina.

These birds differ slightly from the single topotype in the National Museum collection. The edges of the primaries are much brighter yellowish olive green.

Sporophila gutturalis (Licht.).

Ten adults, males and females, from Palomina.

Pœcilothraupis melanogenys Salv. and Godm.

One adult female from Macotama, June 17, 1898.

Euphonia crassirostris Scl.

One young male from Palomina.

Calospiza desmaresti (Gray).

Twelve specimens, males, female, and young, from Palomina.

Calospiza cyanoptera (Swains.).

Twelve adults, males and females, from Palomina and San Miguel.

Ramphocelus dimidiatus Lafr.

Twenty specimens, adults of both sexes and young in first plumage. All from Palomina and San Miguel.

Tachyphonus rufus (Bodd.).

Two adults, male and female, from Palomina.

Procnias tersa occidentalis (Scl.).

Eleven specimens, adult males and females and one young just emerging from first plumage, from Palomina, San Miguel, and San Francisco.

Diglossa sittoides similis (Lafr.).

Two adults, male and female, from San Miguel.

Diglossa albilateralis Lafr.

Three adults, males and female, from San Miguel.

Diglossa nocticolor sp. nov.

Five adult males from Macotama, June.

Type, from Macotama, Colombia. No. 5610, ♂ adult, coll. of E. A. and O. Bangs. Collected June 17, 1898, by W. W. Brown, Jr. Altitude, 8000 ft.

Specific characters.—Nearest to *D. aterrima* Lafr., but differing from that species in having slate gray instead of black rump, upper tail-coverts and flanks.

Color.—Adult ♂: Black all over except rump, upper tail-coverts and flanks, which are slate gray; feet, black; bill—maxilla, black; mandible, black at tip, bluish horn-color at base; 'iris hazel.' *

Size.—Adult ♂: Length, skin, 135; wing, 76; tail, 67.4; exposed culmen, 10.8.

Remarks.—This species is readily distinguished from *D. aterrima* by its slate gray rump, tail-coverts and flanks. It is, however, probably the *D. aterrima* of Salvin and Godman (Ibis, 1880, p. 119).

Compsothlypis pitiayumi pacifica (Berl.).

Five adults, males and females, from Palomina.

Basileuterus mesochrysus Scl.

Six adults of both sexes, all taken at Palomina.

Basileuterus cinereicollis Scl.

Three adult males from San Francisco and Palomina.

Setophaga verticalis Lafr and D'Orb.

Five adults, males and females, from San Miguel.

Setophaga flavivertex Salv.

Two adults, male and female, from Macotama, June 17, 1898.

Thryothorus laetus Bangs.

Three specimens, adult male and female, and young in first plumage, from Palomina.

The adults are in rather worn plumage, but the male agrees exactly with the type of the species from Pueblo Viejo. Adult ♀, No. 5794, is not so heavily spotted on the breast and abdomen as the two males; this may be due to the abraded condition of the feathers, or may be a sexual character. The young example is very different, being altogether unspotted; above it is colored much like the adults, below it is dull rufous, paler on center of belly, and darker on breast and sides, the throat and sides of the head are dull gray.

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* Note by Mr. Brown from fresh specimen.

Henicorhina leucophrys (Tschudi).

Four adults, males and females, from San Francisco, Palomina, and San Miguel.

Catharus aurantiirostris (Hartl.).

Four adult males from Palomina.

Merula phæopyga minuscula subsp. nov.

One adult, sex undetermined, from Palomina, June 1, 1898.

Type from Pueblo Viejo, Colombia. No. 5605, ♂ adult, coll. of E. A. and O. Bangs. Collected March 23, 1898, by W. W. Brown, Jr. Altitude, 8000 ft.

Subspecific characters.—Smaller than true *M. phæopyga* of British Guiana; wing shorter; color of back and crown darker (olive in *M. phæopyga minuscula*, bistre in *M. phæopyga phæopyga*).

Size.—Type, ♂ adult: Length, skin, 183; wing, 102.4; tail, 81.2; exposed culmen, 17; tarsus, 29.

Topotype, No. 5604, ♂ adult, Length, skin, 185; wing, 103; tail, 82; exposed culmen, 16; tarsus, 27.6.

Remarks.—Although very like true *M. phæopyga*, the bird of the Santa Marta Mountains is slightly smaller and a darker more olive brown above. I no longer have any hesitation in regarding it as a fairly well marked subspecies. It is much more closely related to true *M. phæopyga* than to any of the other races of that thrush.

Mr. Brown, though in the mountains during the breeding season, took but three examples of *M. phæopyga minuscula*, and reports it a rare bird. As it is a remarkable singer, it is not likely that he passed many males unnoticed, at that season.

Merula gigas cacozela subsp. nov.

Two adults, male and female, from Macotama, June.

Type from Macotama, Colombia. No. 5685, ♀ adult, coll of E. A. and O. Bangs. Collected June 21, 1898, by W. W. Brown, Jr. Altitude 8000 ft.

Subspecific characters.—Size of true *M. gigas;* tail much shorter; colors paler, the tail in particular much lighter in color.

Color.—Upper parts, between olive and hair brown; primaries and tail the same color, but a shade darker; under parts varying from dull broccoli brown to hair brown, slightly shaded with cinnamon on abdomen; axillars, bend of wing and under primary coverts olive brown; under wing-coverts hazel, shading towards olive brown on the centers of the feathers; tarsus, foot and bill bright yellow.

Size.—Adult ♂: Length, skin, 277; wing, 144.6; tail, 135; exposed culmen, 31; tarsus, 45.4. Adult ♀: Length, skin, 260; wing, 144; tail, 134.6; exposed culmen, 30.8; tarsus, 46.

Remarks.—When compared with Bogota specimens, which are considered typical *M. gigas*, the very short, light colored tails of the Macotama birds serve to distinguish the subspecies *cacozela*. This form is probably found throughout the Sierra Nevada de Santa Marta. Messrs. Salvin and Godman (Ibis, 1879, p. 198) record one specimen collected at San Sebastian by Simons, and notice that it differs from true *M. gigas*.

There is also a young thrush in the collection, apparently about full grown though in first plumage, taken at Palomina, May 21, 1898. I take it to be the young of my *Merula incompta*, but as Mr. Brown secured no adults of that species at Palomina, I cannot be sure. It certainly is not the young of either *M. gigas cacozela* or *M. phæopyga minuscula*.

VOL. XII, PP. 183-186 NOVEMBER 16, 1898

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

ON *SCIURUS VARIABILIS* FROM THE SANTA MARTA REGION OF COLOMBIA.

BY OUTRAM BANGS.

Among the mammals collected by Mr W. W. Brown, Jr., in the Santa Marta region of Colombia is a fine series of twenty-four squirrels. Twenty-one of these are from the lowlands in the immediate neighborhood of Santa Marta, at an altitude of from 500 to 600 feet, and are true *Sciurus variabilis* Geoffroy.* The other three were taken in the high sierra—one at Palomina (altitude, 5000 feet) and two at Pueblo Viejo (altitude, 8000 feet), and belong to quite a different mountain race of that squirrel.

The form from the high mountain forest of the Sierra Nevada appears to be undescribed. Its differences from true *S. variabilis* are very interesting and are exactly what would be expected from the character of its surroundings. The smaller size, much duller, deeper coloration and very much smaller audital bullæ of the new form all indicate an inhabitant of the dark, dense, saturated, luxuriant mountain forest; while the large size, long tail, vivid color and large audital bullæ of true *S. variabilis* point rather to an existence spent in the dry, open, brushy forest of the burning lowlands.

**Sciurus variabilis* was described from specimens of uncertain locality, though without doubt from Colombia, as Geoffroy tells us that the collection of which these squirrels formed a part was made in North America, the West Indies, and Colombia. It therefore seems fair to regard the specimens from the lowlands of the Colombian coast as strictly typical *Sciurus variabilis*.

Sciurus variabilis variabilis Is. Geoffroy.

Sciurus variabilis Is. Geoffroy, Mag. de Zool. I, plate iv, 1832.

Type locality.—Colombia (restricted here to the lowland forest about Santa Marta; altitude, 500–600 feet).

General characters.—Size rather large; ear high; colors vivid; skull large; audital bullæ large, much inflated, pappery; no small upper premolar.

Color.—(No. 8018, ♀ adult, from Santa Marta, 600 ft. altitude, apparently representing the normal phase of coloration). Upper parts—head, back, rump, about 90 mm. of basal portion of tail (above and below), and upper surface of legs orange-rufous, variegated with black—each hair orange-rufous, with a black median band; lower sides, shoulders, arms, a large patch above each shoulder nearly meeting on back, feet, hands, and rather more than the apical three-fourths of tail (all around) vivid, intense orange-rufous—the hairs without black bands; sides of head and chin brownish ochraceous; hairs of back and sides plumbeous at base; line of demarkation between colors of upper and under parts low down; under parts pure white to base of hairs, this color extending half way along under side of neck and in a narrow line a little way down under surface of leg and arm.

Variations in color.—The variations in color run in two opposite directions from the normal, caused (1) by the widening of the black median bands of the hairs of the upper parts, and (2) by the narrowing or total disappearance of the black bands—one 'melanism,' the other 'erythrism.' ? *

The darkest individual in the series (No. 8015) has all the black bands of the hairs of back and sides, those of legs and arms also being banded, much broadened, the general tone being dusky, somewhat relieved by a few rufous-tipped hairs; the tail is as usual above, but darker below. No. 8014 has no black bands at all on the hairs of the upper parts, being a uniform fiery orange-rufous above.

Five other specimens approach either one or the other of these extremes to a greater or less degree, leaving fourteen out of twenty-one examples perfectly normal, with but a minimum of color variation. The under parts of all are clear white.

Cranial characters.—Skull normal, without small upper premolar; audital bullæ large, much inflated, thin and papery.

Size of an average old adult ♀ skull, No. 8028.—Basal length, 49.6; occipito-nasal length, 57.4; zygomatic width, 34; mastoid width, 26; interorbital width, 19.8; length of nasals, 19; length of upper tooth row, 9.6; length of mandible, 33.

(For measurements see table, p. 186.)

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* See O. Thomas on color variation in *Sciurus finlaysoni*, Proc. Zool. Soc. London, 1898, p. 245.

Sciurus variabilis saltuensis subsp. nov.

Type from Pueblo Viejo, Colombia (altitude, 8000 ft). No. 8144, ♀ old adult, coll. of E. A. and O. Bangs. Collected March 26, 1898, by W. W. Brown, Jr.

Subspecific characters.—Smaller than true *S. variabilis;* tail shorter; colors duller, deeper and darker; feet and hands much darker in color; no patch of clear rufous on shoulders and sides—the hairs of this region, and also those of feet, hands and lower sides, with a black median band like the hairs of the rest of upper parts; skull smaller, and more solid; audital bullæ smaller, thicker and less inflated.

Color.—Upper parts, deep, tawny-rufous varied with black—each hair plumbeous at base, then rufous with a black median band; tail much deeper in color than that of true *S. variabilis,* the hairs of its sides with a more distinct black median band; under parts clear white to base of hairs.

Cranial characters.—Skull similar to that of true *S. variabilis* but decidedly smaller and rather more solid; audital bullæ much smaller, thicker and less inflated.

Size of type skull (old adult ♀): Basal length, 46; occipito-nasal length, 54.2; zygomatic width, 31.6; mastoid width, 24; interorbital width, 18; length of nasals, 16.4; length of upper tooth row, 9; length of mandible, 30. (For measurements see table, p. 186.)

Remarks.—Mr. Brown found this mountain representative of *S. variabilis* very rare in the several places he visited in the higher Sierra and secured but three individuals: one at Palomina, May 2, 1898; and two at Pueblo Viejo, March 20 and 26, 1898. These three skins are indistinguishable in color.

Measurements.

No.	Sex and age.	Locality.	Total length.	Tail vertebræ.	Hind foot.	Ear from notch.
Sciurus variabilis variabilis Is. Geoffroy.						
8019	♂ old ad.	Santa Marta	500	250	53	23
8023	♀ old ad.	" "	485	245	60	27
8011	♀ old ad.	" "	482	250	57	25
8028	♀ old ad.	" "	460	235	58	25
8024	♂ old ad.	" "	467	225	55	27
8012	♂ ad	" "	500	255	55	27
8018	♀ ad	" "	460	230	55	26
8025	♂ ad	" "	465	230	55	25
8022	♀ ad	" "	470	240	56	27
8014	♂ ad	" "	475	240	57	26
8013	♀ ad	" "	475	240	55	26
8026	♂ ad	" "	460	230	57	26
8030	♂ ad	" "	450	220	53	25
8015	♂ ad	" "	452	220	55	26
8016	♀ ad	" "	443	215	51	27
8020	♂ ad	" "	445	235	55	27
8010	♂ yg. ad.	" "	460	230	56	26
8017	♂ yg. ad.	" "	442	225	57	25
8027	♂ yg. ad.	" "	435	220	53	25
8021	♂ yg. ad.	" "	435	215	55	25
Sciurus variabilis saltuensis subsp. nov.						
8144	♀ old ad.	Pueblo Viejo	420	200	54	26
8145	♂ old ad.	" "	Head &	body 230	55	27
8244	♀ ad	Palomina	410	190	52	27

Note.—'Old adult,' 'adult,' and 'young adult' are given in accordance with the appearance of the skull and teeth, regardless of the collector's measurements.

VOL. XII, PP. 187-188 NOVEMBER 16, 1898

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

A NEW ROCK VOLE FROM LABRADOR.

BY OUTRAM BANGS.

Early last summer Mr. Ernest Doane left Newfoundland and crossed the straits of Belle Isle to Black Bay, Labrador, where he has been collecting mammals ever since for the Bangs collection. Just before he went into winter quarters he sent one consignment of skins, including twelve examples of a rock vole which proves to be different from true *Microtus chrotorrhinus* (Miller). For the present I treat the new form as a subspecies. The rock vole has now been recorded from several pretty widely separated localities,* though it still remains one of the rarest and most desirable among the smaller mammals of northeastern North America.

The Labrador series includes four adults and eight young of various sizes, all agreeing closely in color. The new form differs from true *M. chrotorrhinus* in its paler, more yellowish gray coloring, in the larger and lighter yellow nose patches, and in several well-marked and constant cranial and dental characters. It may be known as—

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* Mt. Washington (type locality—8 specimens); Profile Lake, N. H. (1 specimen), and Trowser's Lake, N. B. (1 specimen)—Miller, *Proc. Bost. Soc. Nat. Hist., Mar. 24, 1894, pp. 190-193;* Trowser's Lake (3 additional specimens) and Gulquac Lake, N. B. (1 specimen)—Allen, *Bull. Am. Mus. Nat. Hist., 1894, p. 360;* Lake Edward, Quebec (9 specimens)—Bangs, *Proc. Biol. Soc. Wash., X, Mar. 9, 1896, p. 49;* Breed's, Essex Co., N. Y. (27 specimens), and above Profile Lake, N. H. (1 specimen)—Batchelder, *Proc. Bost. Soc. Nat. Hist., Oct., 1896, pp. 188, 189;* Hunter Mountain, Catskills, N. Y. (1 specimen)—Mearns, *Proc. U. S. Nat. Mus., 1898, p. 349.*

Microtus chrotorrhinus ravus[*] subsp. nov.

Type from Black Bay, Labrador, ♂ old adult, No. 7951, coll. of E. A. and O. Bangs. Collected July 15, 1898, by Ernest Doane.

Color and pelage.—Fur longer, softer, and more like Phenacomys than in *M. chrotorrhinus chrotorrhinus;* all the colors paler; upper parts pale grayish raw umber, somewhat darkened on back by a sprinkling of black-tipped hairs; nose and face back to eyes pale tawny ochraceous, this color suffusing much of head, especially about the ears; under parts gray, extending well up on sides and gradually blending with color of upper parts; feet and hands gray; tail dusky brown above, paler and grayer below, sparsely haired; whiskers black and yellowish white mixed.

Cranial and dental characters.—The skull, compared with that of true *M. chrotorrhinus*, is much more slender and more constricted between the orbits; rostrum more slender; incisive foramina longer; audital bullæ flatter, less inflated, more oblong, and less round. Pattern of enamel folding of molar teeth substantially the same; molars all much smaller and more delicate; incisors more slender.

Measurements.—The type, ♂ old adult; total length, 170; tail vertebræ, 50; hind foot, 22; ear from notch, 14. Averages of four adult topotypes, of both sexes: total length, 159.75; tail vertebræ, 46; hind foot, 21.25;[†] ear from notch, 12.5. Skull (type, ♂ old adult)—basal length, 24.8; occipito-nasal length, 26.6; zygomatic width, 15; mastoid width, 11.6; width between orbits, 3.6; length of nasals, 7.4; length of upper tooth row, 6; length of mandible, 16.4.

Remarks.—I find it very hard to express the differences in color between true *M. chrotorrhinus* and *M. c. ravus*, though they are evident enough when series of the two forms are laid side by side. Young examples show the differences in color quite as well as do adults.

Without a complete series from connecting localities, it seems better to regard *ravus* merely as a subspecies of *chrotorrhinus*, although the rock voles from Lake Edward, Quebec, are in every way inseparable from true *chrotorrhinus* from the type locality—Mount Washington, N. H.—and show no approach to the form of the coast of middle Labrador.

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[*] Ravus = gray-yellow.

[†] The collector's measurements for foot run larger in *M. c. ravus* than in true *M. chrotorrhinus.* I can, however, detect no appreciable difference in the dried skins.

Vol. XII, pp. 189-190 December 30, 1898

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

A NEW *SIGMODON* FROM THE SANTA MARTA REGION OF COLOMBIA.

BY OUTRAM BANGS.

The collection of mammals made by W. W. Brown, Jr., in the Sierra Nevada de Santa Marta contains but three examples of *Sigmodon.* Two of these are adult males and practically alike: one taken at Pueblo Viejo, at an altitude of 8000 feet, on March 23, 1898; the other at Palomina, 5000 feet, June 21, 1898. The third specimen is an adult female from Pueblo Viejo. It is so much smaller than the two males and differs so much otherwise, that without more material I hesitate to refer it to the same species. I have therefore left it out of consideration and based my description wholly upon the two males.

The new form is closely related to both *S. borucæ* Allen, from Costa Rica, and *S. bogotensis* Allen from Bogota, differing from the former principally in harsher pelage and much more hairy tail, and from the latter in much paler coloration. It may be known as

Sigmodon sanctæmartæ sp. nov.

Type from Pueblo Viejo,* Colombia. No. 8105, ♂ adult, coll. of E. A. and O. Bangs. Collected Mar. 23, 1898, by W. W. Brown, Jr. Altitude, 8000 feet.

General characters.—Pelage long, full, hispid; tail very hairy; color above, dull tawny-ochraceous, lined with blackish; ear rather large, sparsely haired on outside; skull with wide nasals and large, wide, incisive foramina (teeth too worn to show characters well), otherwise not differing much from the skull of the type species, *S. hispidus*.

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* There are at least three towns in Colombia called Pueblo Viejo. The one at which Mr. Brown collected is in the center of the Sierra Nevada, not far from the source of Rio Ancho.

Color.—Upper parts dull tawny-ochraceous, becoming darker and more russet on rump, and lined with blackish tipped hairs, which are most numerous along back; hairs plumbeous at base, except a few sprinkled over back and sides, which are yellowish-white throughout their entire length;* nose and cheeks wood brown; under parts dull wood brown to whitish, the plumbeous under fur showing through; upper surface of feet and hands dark gray; tail very hairy, dusky above, dull grayish below.

Measurements.—Type, total length, 282; tail vertebræ, 115; hind foot, 32; ear from notch, 20. No. 8250, ♂ adult, from Palomina: total length, 290; tail vertebræ, 120; hind foot, 30; ear from notch, 17.

Skull, type, basal length, 32; occipitonasal length, 36.4; zygomatic width, 19.2; mastoid width, 14; interorbital width, 5.6; length of nasals, 13.2; breadth of nasals, 4.2.

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* This character is shown equally by both specimens, and gives a peculiar grayish cast to the fur.

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